

SECTION THREE

TOTAL COSTS AND FINANCIAL EFFECTS OF THE FINAL CAFO REGULATIONS

This section presents the national level aggregate compliance costs and economic impacts on regulated facilities under the final CAFO regulations. Section 3.1 describes the regulated sectors and presents EPA's estimates of the number of affected facilities. Section 3.2 presents EPA's estimates of the expected pre-tax costs (2001 dollars) to industry as a result of the final CAFO regulations for both the NPDES and ELG revisions. (Section 5 of this report presents additional costs of the final regulations to Federal and State permitting authorities.) Section 3.3 and 3.4 present the results of EPA's analysis that evaluates the financial effects on CAFOs with more than 1,000 AU under the effluent guideline regulations. Section 3.3 examines the impact on existing facilities of complying with the final ELG requirements for Best Available Technologies Economically Achievable (BATEA); Section 3.4 examines the impact to new facilities on complying with the final ELG requirements for New Source Performance Standards (NSPS). Finally, Section 3.5 presents the results of EPA's market level analysis, focusing on the potential secondary impacts of the final NPDES and ELG regulations on both consumer and farm level prices and quantities, as well as changes in employment and economic output at the national level.

3.1 IDENTIFICATION AND NUMBER OF AFFECTED CAFOs

3.1.1 Identification of Affected Industry Sectors

3.1.1.1 *Beef Subcategory*

Cattle feedlots are identified under NAICS 112112 (SIC 0211, beef cattle feedlots) and NAICS 112111, beef cattle ranching and farming (SIC 0212, beef cattle, except feedlots). This sector comprises establishments primarily engaged in feeding cattle and calves for fattening, including beef cattle feedlots and feed yards (except stockyards for transportation).

The beef cattle industry can be divided into four separate producer segments:

- *Feedlot operations* fatten or “finish” feeder cattle before slaughter and constitute the final phase of fed cattle production. Calves usually begin the finishing stage after reaching 6 months of age or reaching at least 400 pounds. Cattle are typically held for 150 to 180 days and weigh 1,150 to 1,250 pounds (for steers) or 1,050 to 1,150 pounds (for heifers) at slaughter.
- *Veal operations* raise male dairy calves for slaughter. The majority of calves are “special fed” or raised on a low-fiber diet until about 16 to 20 weeks of age, when they weigh about 450 pounds.
- *Stocker or backgrounding operations* coordinate the flow of animals from breeding operations to feedlots by feeding calves after weaning and before they enter a feedlot. Calves are kept 60 days to 6 months or until they reach a weight of about 400 pounds.

- *Cow-calf producers* typically maintain a herd of mature cows, some replacement heifers, and a few bulls, and they breed and raise calves to prepare them for fattening at a feedlot. Calves typically reach maturity on pasture and hay and are usually sold at weaning. Cow-calf operators may also retain the calves and continue to raise them on pasture until they reach 600 to 800 pounds and are ready for the feedlot.

AFOs in this sector that might be affected by the final regulations include facilities that confine animals. More information on the types of facilities in this sector that might be covered by the final regulations is provided in the *Development Document* (USEPA, 2002) and the rulemaking record.

3.1.1.2 Dairy Subcategory

Operations that produce milk are identified under NAICS 11212, dairy cattle and milk production (SIC 0241, dairy farms). A dairy operation may have several types of animal groups present, including the following:

- *Calves* (0 to 5 months)
- *Heifers* (6 to 24 months)
- *Lactating dairy cows* (currently producing milk)
- *Cows close to calving and dry cows* (not currently producing milk)
- *Bulls*

AFOs in this sector that might be affected by the final regulations include facilities that confine animals. More information on the types of facilities in this sector that might be covered by the final regulations is provided in the *Development Document* (USEPA, 2002) and the rulemaking record.

3.1.1.3 Hog Subcategory

Hog operations that raise or feed hogs and pigs either independently or on a contract basis are identified under NAICS 11221, hog and pig farming (SIC 0213, hogs). Hog operations may be categorized by six facility types based on the life stage of the animal in which they specialize:

- *Farrow-to-wean* operations that breed pigs and ship 10- to 15-pound pigs to nursery operations.
- *Farrowing-nursery* operations that breed pigs and ship 40- to 60-pound “feeder” pigs to growing-finishing operations.
- *Nursery* operations that manage weaned pigs (more than 10 to 15 pounds) and ship 40- to 60-pound “feeder” pigs to growing-finishing operations.
- *Growing-finishing or feeder-to-finish* operations that handle 40- to 60-pound pigs and “finish” them to market weights of about 255 pounds.

- *Farrow-to-finish* operations that handle all stages of production from breeding through finishing.
- *Wean-to-finish* operations that handle all stages of production, except breeding, from weaning (10- to 15-pound pigs) through finishing.

AFOs in this sector that might be affected by the final regulations include facilities that confine animals. More information on the types of facilities in this sector that might be covered by the final regulations is provided in the *Development Document* (USEPA, 2002) and the rulemaking record.

3.1.1.4 Poultry Subcategory

Poultry operations can be classified into three individual sectors based on the type of commodity in which they specialize. These sectors include operations that breed and/or raise the following:

- *Broilers* or young meat chickens that are raised to a live weight of 4 to 4.5 pounds and other meat-type chickens, including roasters that are raised to 8 to 9 pounds. Classification: NAICS 11232, broilers and other meat-type chickens (SIC 0251, broiler, fryer, and roaster chickens).
- *Turkeys and turkey hens*, including whole turkey hens that range from 8 to 15 pounds at slaughter, depending on market, and also turkey “canners and cut-ups” that range from 22 to 40 pounds. Classification: NAICS 11233, turkey production (SIC 0253, turkey and turkey eggs).
- *Hens that lay shell eggs*, including eggs that are sold for human consumption and eggs that are produced for hatching purposes. Classification: NAICS 11231, Chicken egg production (SIC 0252, chicken eggs), and NAICS 11234, poultry hatcheries (SIC 0254, poultry hatcheries).

AFOs in this sector that might be affected by the final regulations include facilities that confine animals. More information on the types of facilities in this sector that might be covered by the final regulations is provided in the *Development Document* (USEPA, 2002) and the rulemaking record.

3.1.2 Estimated Number of AFOs and Regulated CAFOs

USDA reports that there were 1.1 million livestock and poultry farms in the United States in 1997 (USDA/NASS, 1999a). This number includes both confinement and non-confinement (grazing and ranged) production, as well as both commercial and noncommercial operations. As shown in Table 3-1, USDA reports that about 240,000 operations raise animals in confinement (Kellogg, 2002). USDA estimates the number of operations with confined animals by focusing on those operations that meet certain minimum characteristics based on USDA assumptions in terms of the number of animals at an operation. This approach does not specifically focus on characteristics that meet the regulatory definition of an animal feeding operation, as codified at 40 CFR Part 122, according to the number of days animals are confined or the amount of vegetative cover at the production area. As stated in the 2001 Notice, EPA believes this is a reasonable approach to estimate the potential number of confinement operations, given best available data and other limited information.

To estimate the number of AFOs and “potential” CAFOs, USDA first defines “farms with confined livestock types” to be farms with 4 or more animal units of any combination of fattened cattle, milk cows, swine, chickens or turkeys (Kellogg, 2002). In USDA’s analysis, the use of animal units is based on the USDA definitions of 1,000 pounds of liveweight and not EPA’s regulatory definitions, which are expressed in terms of the number of animals on-site (codified in 40 CFR Part 122). USDA estimates of the number of “potential” CAFOs is based on EPA’s regulatory definitions used for the proposed regulations. As defined for the proposed CAFO regulations, one animal unit (AU) is equivalent to one slaughter or feeder cattle, calf or heifer; 0.7 mature dairy cattle; 2.5 hogs (over 55 pounds) or 5 nursery pigs; 55 turkeys; 30 egg-laying chickens (where a wet manure management system is used), and 100 broilers and egg-laying chickens, regardless of the animal waste system used. (Note that the final regulation instead defines one AU as equivalent to 125 broilers and 82 egg-laying chickens; see the final rule preamble). The primary source of data for USDA’s estimate is the 1997 Census of Agriculture (Census). More information on these data is provided in Kellogg (2002) and the 2001 Notice (66 FR 58556).

Table 3-1 shows EPA’s estimates of the number of operations that would be defined as CAFOs under the final regulation (based on USDA’s estimates). Size groups shown break out facilities by broad AU size groups (>1,000 AU and increments among operations with between 300 AU and 1,000 AU).²³ The data reflected in this table are adjusted from USDA’s original estimates to account for layer facilities (800 operations) with wet manure management systems that have a different AU scale and that were not accounted for in USDA estimates of potential CAFOs. EPA’s estimates also differ because other poultry sector data are assessed using a different AU scale—1,000 AU equals 125,000 broilers and 82,000 egg laying chickens—where a dry manure management system is used. EPA estimates further breakouts of the number of egg operations by the type of manure management systems, as well as among hog operations, by whether these are farrow-finish and farrowing operations (grouped under FF) or grow-finish (GF) operations. More information on EPA’s estimates is provided in the *Development Document* (USEPA, 2002) and the rulemaking record.

As shown in Table 3-1, EPA estimates that there were about 10,500 operations that confine more than 1,000 AU in 1997, accounting for about 5 percent of all confinement operations. Total operations with between 300 and 1,000 AU are estimated at about 33,100 operations (Table 3-1). Table 5-2 in Section 5 of this report shows EPA’s estimate of the number of CAFOs by State and EPA region.

To assess the number of operations with between 300 and 1,000 AU that are *defined* as CAFOs under the existing NPDES permit requirements, EPA uses available data to determine the share of all operations in this size group that are affected by the final regulations. EPA uses data and information from USDA, State extension service experts, and agricultural professionals to derive percentage estimates of the number of operations in each sector that meet the conditions of the existing rule for being defined as a CAFO. Table 3-2 shows the resultant number of operations with 300 to 1,000 AU that EPA expects will be defined as CAFOs based on the existing NPDES regulations (labeled in the table as “Status Quo”). More detailed information on EPA’s estimates is in the *NPDES Support Document* available in the rulemaking record (USEPA, 2002n).

²³ As defined for the final CAFO regulations, one animal unit (AU) is equivalent to one slaughter or feeder cattle, calf or heifer; 0.7 mature dairy cattle; 2.5 hogs (over 55 pounds) or 5 nursery pigs; 55 turkeys; 30 egg-laying chickens (where a wet manure management system is used), and 125 broilers and 82 egg-laying chickens, regardless of the animal waste system used.

Table 3-1. Number of AFOs and Potential CAFOs (1997)

| Sector | Total AFOs | Total Operations by Size Group | |
|----------------------------|-----------------------------|--------------------------------|---------------|
| | | >1,000 AU ^{a/} | 300-1,000 AU |
| | | (Number of Operations) | |
| Cattle | 17,796 | 1,766 | 2,682 |
| Heifers | 3,843 | 242 | 724 |
| Veal | 168 | 12 | 57 |
| Dairy | 94,787 | 1,450 | 5,780 |
| Hogs | 51,772 | 3,924 | 9,901 |
| Hogs-FF ^{b/} | | 1,939 | 6,112 |
| Hogs-GF ^{b/} | | 1,985 | 3,789 |
| Chickens | 24,221 | 2,744 | 12,372 |
| Broilers | 17,776 | 1,632 | 10,402 |
| Layers: dry ^{b/} | 6,445 | 729 | 1,170 |
| Layers: wet ^{b/} | | 383 | 800 |
| Turkeys | 3,309 | 388 | 1,615 |
| Other Cattle ^{c/} | 39,634 | 0 | 0 |
| Total CAFOs | 237,821^{d/} | 10,526 | 33,131 |

Source: Derived by EPA from USDA estimates (Kellogg, 2002). Rounded to nearest tenth. AFO totals include operations that raise more than a single animal type. Potential CAFOs adjusted for mixed operations. See *Development Document* (USEPA, 2002) for more detailed information.

^{1/} As defined for the final CAFO regulations, one AU is equivalent to: one slaughter or feeder cattle, calf or heifer; 0.7 mature dairy cattle; 2.5 hogs (over 55 pounds) or 5 nursery pigs; 55 turkeys; 30 egg-laying chickens (where a wet manure management system is used), and 125 broilers and 82 egg-laying chickens (with a dry waste system).

^{2/} Estimated by EPA to break out among production system types (farrowing and farrow-finish [FF] and grow-finish [GF], and laying operations with wet and dry manure management systems).

^{3/} Cattle other than fattened cattle or milk cows.

^{4/} USDA's estimate of the total number of AFOs is adjusted for specialty cases. Specialty cases (estimated at 2,291 operations) are dairies that went out of business in 1997, swine operations with feeder pigs only, and egg-hatching operations. USDA estimates of the total number of potential CAFOs adjusts for double counting of operations with animal populations in one or more sectors that qualify as potential CAFOs.

Table 3-3 shows estimates of the number of facilities that EPA expects will be *designated* as CAFOs by the permitting authority because they are significant contributors to water quality impairment. EPA does not anticipate that many AFOs with fewer than 1,000 AU will be designated by the permitting authority and subject to the final requirements. EPA is aware of very few AFOs that have been designated as CAFOs in the past 20 years. Based on available USDA analyses that measure excessive nutrient application on cropland in some production areas and other farm level data by sector, facility size, and region, EPA estimates that designation might add 172 operations, expressed over the term of a 5-year permit period nationwide (or, on average, about 35 operations each year). More information on EPA's estimates is available in the rulemaking record (USEPA, 2002n).

Table 3-2. Number of Potential Operations *Defined* as CAFOs (1997)

| Sector | Total Operations Defined as CAFOs | |
|---------------------|-----------------------------------|--------------|
| | >1,000 AU | 300-1,000 AU |
| | (number of operations) | |
| Cattle | 1,766 | 174 |
| Heifers | 242 | 230 |
| Veal | 12 | 7 |
| Dairy | 1,450 | 1,949 |
| Hogs | 3,924 | 1,485 |
| Broilers | 1,632 | 520 |
| Layers - Dry | 729 | 26 |
| Layers - Wet | 383 | 24 |
| Turkeys | 388 | 37 |
| Total CAFOs | 10,526 | 4,452 |

Source: EPA's *Development Document* (USEPA, 2002) and NPDES Support Document (USEPA, 2002n). See notes Table 3-1.

Table 3-3. Number of Potential Operations *Designated* as CAFOs (1997-2001)

| Sector/Size Category | Total | Operations with | Operations with |
|----------------------|------------------------|-----------------|-----------------|
| | (number of operations) | | |
| Cattle | 15 | 13 | 2 |
| Veal | 0 | 0 | 0 |
| Heifers | 3 | 3 | 0 |
| Dairy | 30 | 28 | 2 |
| Hogs | 52 | 50 | 2 |
| Broilers | 52 | 50 | 2 |
| Layers - Dry | 2 | 1 | 1 |
| Layers - Wet | 8 | 7 | 1 |
| Turkeys | 10 | 8 | 2 |
| Total | 172 | 160 | 12 |

Source: EPA's *Development Document* (USEPA, 2002) and NPDES Support Document (USEPA, 2002n). See notes Table 3-1. Estimates are shown projected over a 5-year period.

3.2 ESTIMATED ANNUAL COSTS OF THE FINAL CAFO REGULATIONS

This section presents EPA's estimates of the compliance costs to regulated CAFOs for a range of technology options considered by the Agency during the development of these regulations. (Section 5 of this report presents costs of the final regulations to Federal and State permitting authorities.)

This EA presents the results of two technology options where EPA has estimated the cost of land application based on nitrogen-based application rates only (Option 1) and also the cost of land application based on nitrogen-based application rates, except in those instances where EPA believes that phosphorus-based rates are likely to be appropriate (Option 2). The final rule specifies that the determination of application rates is to be based on the technical standards established by the Director and EPA expects that these standards will require phosphorus-based application, where appropriate. The rule also provides for these standards to include appropriate flexibilities in the use of phosphorus-based rates, such as multi-year phosphorus application, but the potential costs savings resulting from these flexibilities are not reflected in the analysis. As a result, the cost and economic impacts of this rule may have been overestimated.

EPA evaluated the costs of these technology options for all operations defined as CAFOs with more than 1,000 AU and for those operations that are defined as CAFOs with between 300 and 1,000 AU. EPA calculates these costs using the data and approaches described in the *Development Document* (USEPA, 2002) and in Section 2 of this report. For the purpose of estimating total regulatory costs of the final CAFO regulations, EPA assumes that the individual per-CAFO costs to comply with the effluent guideline regulations are similar to the costs that will be incurred by operations with between 300 and 1,000 AU to comply with the revised NPDES requirements (although these smaller-sized operations will be subject to BPJ and not the ELG requirements). These cost estimates, therefore, may further be overstated for this size category.

3.2.1 Compliance Costs to CAFOs Under the Final Regulations

Table 3-4 summarizes the total annualized compliance costs to CAFOs. Results are shown as a range of estimates between Option 1 and Option 2. The table shows these costs broken out by sector and by broad facility size category. As shown in the table, EPA estimates the total estimated costs to CAFOs range from \$141 million (Option 1) to \$326 million annually (Option 2), expressed as pre-tax, 2001 dollars. Most of this cost (roughly 50 percent) is incurred by the dairy sector, with another roughly 30 percent incurred within the cattle sectors (including beef, veal, and heifer sectors).

Of this total, EPA estimates that the cost to operations with more than 1,000 AU ranges from \$119 million (Option 1) to \$283 million annually (Option 2). Total estimated costs to facilities defined as CAFOs with between 300 and 1,000 AU ranges from \$19 million (Option 1) to \$39 million annually (Option 2). EPA estimates that of the total cost to operations that may be designated as CAFOs ranges from about \$3 million to \$4 million annually, depending on the regulatory option.

These aggregated cost estimates reflect pre-tax costs. However, EPA's model calculates both pre-tax and post-tax costs (see Section 2.2.4). The post-tax costs reflect the fact that a CAFO would be able to depreciate or expense these costs, thus generating a tax savings. Post-tax costs thus are the actual costs the CAFO would face. Pre-tax costs reflect the estimated total social cost of the proposed regulations, including lost tax revenue to governments. Pre-tax dollars are used when comparing

estimated costs to monetized benefits that are estimated to accrue under the final regulations (see Section 5). All costs presented in this section are expressed in terms of pre-tax dollars and do not account for annual tax savings to CAFOs. However, post-tax costs are also used to evaluate impacts on regulated facilities using a discounted cash flow analysis, as presented in Section 3.3.

Estimated compliance costs are initially evaluated in 1997 dollars and then adjusted to 2001 dollars using *Engineering News Record's* Construction Cost Index (CCI) (ENR, 2002).²⁴ The base year for this analysis is 1997, corresponding with available data from USDA's 1997 Agriculture Census. Estimated compliance costs presented in the *Development Document* are estimated in 1997 dollars (USEPA, 2002).

Table 3-4. Annual Pre-tax Cost of the Rule, \$2001 (Option 1 & Option 2)

| Sector | Number of Operations | | Aggregate Incremental Costs | | | |
|---------------------|----------------------|-----------------------|-----------------------------|---------------------------|-----------------------|---------------------|
| | CAFOs >1,000 AU | CAFOs 300-1,000 AU | Total | CAFOs >1,000 AU | CAFOs 300-1,000 AU | Designated CAFOs |
| | (number) | (number) | | (2001, millions, pre-tax) | | |
| ELG Option 1 | | | | | | |
| Fed Cattle | 1,766 | 174 | \$19.2 | \$17.8 | \$1.1 | \$0.3 |
| Veal | 12 | 230 | <\$0.1 | <\$0.1 | <\$0.1 | \$0.0 |
| Heifer | 242 | 7 | \$3.5 | \$1.3 | \$2.1 | \$0.1 |
| Dairy | 1,450 | 1,949 | \$71.5 | \$59.7 | \$11.3 | \$0.5 |
| Hogs | 3,924 | 1,485 | \$8.6 | \$6.4 | \$2.1 | \$0.1 |
| Broilers | 1,632 | 520 | \$18.5 | \$15.3 | \$2.1 | \$1.1 |
| Layers - Dry | 729 | 26 | \$6.6 | \$6.3 | \$0.1 | \$0.2 |
| Layers - Wet | 383 | 24 | \$6.4 | \$6.4 | \$0.0 | <\$0.1 |
| Turkeys | 388 | 37 | \$6.3 | \$5.9 | \$0.2 | \$0.2 |
| Total | 10,526 | 4,452 | \$140.6 | \$119.1 | \$19.0 | \$2.5 |
| ELG Option 2 | | | | | | |
| Fed Cattle | 1,766 | 174 | \$88.2 | \$85.8 | \$1.9 | \$0.5 |
| Veal | 12 | 230 | \$0.0 | <\$0.1 | <\$0.1 | \$0.0 |
| Heifer | 242 | 7 | \$6.3 | \$3.8 | \$2.4 | \$0.1 |
| Dairy | 1,450 | 1,949 | \$151.1 | \$128.2 | \$22.0 | \$0.9 |
| Hogs | 3,924 | 1,485 | \$34.8 | \$24.9 | \$9.5 | \$0.4 |
| Broilers | 1,632 | 520 | \$20.5 | \$16.8 | \$2.4 | \$1.3 |
| Layers - Dry | 729 | 26 | \$7.5 | \$7.2 | \$0.1 | \$0.2 |
| Layers - Wet | 383 | 24 | \$8.9 | \$8.4 | \$0.5 | <\$0.1 |
| Turkeys | 388 | 37 | \$8.7 | \$8.1 | \$0.3 | \$0.3 |
| Total | 10,526 | 4,452 | \$326.0 | \$283.2 | \$39.1 | \$3.8 |

May not add due to rounding. Number of operations do not include designated facilities. See notes Table 3-1.

²⁴ Adjustment factor = (2001 CCI)/(1997 CCI) = 6342/5825 = 1.0888

3.2.2 Comparison with the Proposed Regulations

For the 2001 Proposal, EPA considered various alternative regulatory options, which are summarized in Table 1-2 in Section 1 of this report. The proposed CAFO regulations noted that EPA's "preferred BAT option" at the time of proposal required nitrogen-based and, where necessary, phosphorus-based land application controls at all livestock and poultry CAFOs (Option 2), along with the additional requirement that all cattle and dairy operations (except veal) must conduct ground water monitoring and implement controls if the ground water beneath the production area has a direct hydrologic connection to surface water (Option 3), and with the additional requirement that all hog, veal, and poultry CAFOs achieve zero discharge from the animal production area with no exception for storm events (Option 5). During the Agency's Option Selection process for the final regulations, EPA evaluated these and other options. The results of this analysis are presented in this section; see also USEPA, 2002I (DCN 375086) in the rulemaking record.²⁵ This comparison presents the results for five technology options (see also Table 1-2):

- Option 1 would require land application at the CAFO to be consistent with proper agricultural practices, including limiting manure application to the nitrogen needs of the crops grown
- Option 2 would require land application at the CAFO to be consistent with proper agricultural practices, including limiting manure application to the nitrogen needs of the crops grown, or where necessary, to the phosphorus needs of the crops
- Option 3 would add to Option 2 by requiring the operation to perform ground water monitoring and controls, unless it can show that the ground water beneath manure storage areas or stockpiles does not have a direct hydrologic connection to surface water
- Option 5 that would add to Option 2 by establishing a zero discharge requirement from the production area that does not allow for an overflow under any circumstances
- Option 7 that would add to Option 2 by prohibiting manure application to frozen, snow-covered or saturated ground.

Compared to the proposed requirements, EPA is promulgating a less costly regulatory option and is limiting the scope of the final revised regulations. See Section 4 of the final preamble for more details.

Table 3-5 summarizes the total annualized (pre-tax) costs of the alternative technology options for each of the ELG technology options that EPA considered in developing the final CAFO regulations. This comparison does not include estimated costs for designated facilities. As shown in the table, among operations with more than 1,000 AU, the total estimated costs across these options range from about \$119 million and \$640 million per year (pre-tax, 2001 dollars), not including the potential costs to designated CAFO facilities. Note that estimated costs for Option 3 and Option 7 are calculated using a previous set of engineering costs (April 4, 2002) and also assume an alternative AU thresholds for broiler and egg-laying operations (where 1,000 AU would equal 100,000 broiler and egg-laying operation with dry manure systems). Also, EPA did not estimate costs or financial impacts within the cattle and

²⁵ Costs for Option 3 and Option 7 are calculated using April 4, 2002 engineering costs and alternative AU thresholds for the broiler and egg-laying sector.

dairy sectors under Option 5 because the Agency does not consider housing of large animals under this option to be practicable in these sectors.

More cost information is provided in Tables 3-6(a) and 3-6(b). Table 3-6(a) shows estimated compliance costs on a per-animal (inventory) basis. Table 3-6(b) compares estimated per-animal costs to average operating costs for model CAFOs. Ranges are expressed across minimum and maximum values. Refer also to Appendix B and Appendix D for more detailed cost information.

Table 3-5. Pre-tax ELG Option Costs, by Sector and Size Group (\$2001)

| Sector | #CAFOs | Option 1 | Option 2 | Option 3 | Option 5 | Option 7 |
|---------------------------------------|---------------|----------------|----------------|----------------|----------------|----------------|
| All Defined CAFOs >300 AU | | | | | | |
| Beef | 1,939 | \$19.0 | \$87.7 | \$87.7 | N/A | \$63.9 |
| Veal | 20 | <\$0.1 | <\$0.1 | <\$0.1 | N/A | <\$0.1 |
| Heifer | 472 | \$3.3 | \$6.2 | \$8.3 | N/A | \$7.7 |
| Dairy | 3,398 | \$71.0 | \$150.2 | \$203.5 | N/A | \$555.4 |
| Hog | 5,409 | \$8.6 | \$34.6 | \$148.6 | \$144.1 | \$75.3 |
| Broiler | 2,152 | \$17.4 | \$19.2 | \$53.2 | \$31.7 | \$43.2 |
| Layer | 1,162 | \$12.7 | \$16.2 | \$30.9 | \$17.3 | \$19.8 |
| Turkey | 425 | \$6.1 | \$8.4 | \$12.9 | \$8.4 | \$10.2 |
| Total | 14,977 | \$138.2 | \$322.6 | \$545.3 | \$201.5 | \$775.5 |
| All Defined CAFOs >1,000 AU | | | | | | |
| Beef | 1,766 | \$17.8 | \$85.8 | \$83.1 | N/A | \$60.0 |
| Veal | 12 | \$0.0 | <\$0.1 | <\$0.1 | N/A | <\$0.1 |
| Heifer | 242 | \$1.3 | \$3.8 | \$4.9 | N/A | \$4.9 |
| Dairy | 1,450 | \$59.7 | \$128.2 | \$152.9 | N/A | \$442.6 |
| Hog | 3,924 | \$6.4 | \$24.9 | \$132.3 | \$114.5 | \$64.6 |
| Broiler | 2,945 | \$15.3 | \$16.8 | \$47.8 | \$28.2 | \$39.7 |
| Layer | 960 | \$12.7 | \$15.6 | \$29.3 | \$16.6 | \$18.5 |
| Turkey | 388 | \$5.9 | \$8.1 | \$12.5 | \$8.1 | \$9.9 |
| Total | 10,526 | \$119.1 | \$283.3 | \$462.8 | \$167.4 | \$640.2 |
| All Defined CAFOs 300-1000 AU | | | | | | |
| Beef | 173 | \$1.1 | \$1.9 | \$4.6 | N/A | \$3.9 |
| Veal | 8 | <\$0.1 | <\$0.1 | <\$0.1 | N/A | <\$0.1 |
| Heifer | 230 | \$2.1 | \$2.4 | \$3.4 | N/A | \$2.8 |
| Dairy | 1,948 | \$11.3 | \$22.0 | \$50.6 | N/A | \$112.8 |
| Hog | 1,485 | \$2.1 | \$9.5 | \$16.3 | \$29.6 | \$10.7 |
| Broiler | 520 | \$2.1 | \$2.4 | \$5.4 | \$3.4 | \$3.5 |
| Layer | 50 | \$0.1 | \$0.6 | \$1.6 | \$0.7 | \$1.4 |
| Turkey | 37 | \$0.2 | \$0.3 | \$0.4 | \$0.3 | \$0.3 |
| Total | 4,451 | \$19.0 | \$39.1 | \$82.5 | \$34.0 | \$135.3 |

Source: USEPA. Costs for Option 3 and Option 7 are calculated using April 4, 2002 engineering costs and assume an alternative AU thresholds for broiler and egg-laying operations; see also USEPA, 2002I—DCN 375086). N/A = “not applicable” since EPA does not consider housing of large animals in some sectors to be practicable.

Table 3-6a. Per Head ELG Option Costs (Minimum and Maximum), by Sector and Size Group (\$1997).

| Sector/ Size Group | Option 1 | | Option 2 | | Option 3 | | Option 5 | | Option 7 | |
|-----------------------|----------|---------|----------|---------|----------|---------|----------|--------|----------|---------|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Beef | | | | | | | | | | |
| >1000 AU | \$0.1 | \$51.1 | \$2.2 | \$49.6 | \$0.8 | \$61.2 | N/A | N/A | \$0.8 | \$135.5 |
| 300-1000AU | \$3.4 | \$54.6 | \$7.4 | \$69.3 | \$5.3 | \$108.2 | N/A | N/A | \$5.9 | \$117.0 |
| Veal | | | | | | | | | | |
| >1000 AU | \$1.3 | \$1.7 | \$1.3 | \$1.7 | \$2.2 | \$3.2 | N/A | N/A | \$1.3 | \$1.8 |
| 300-1000AU | \$1.3 | \$4.5 | \$1.3 | \$4.5 | \$1.7 | \$8.7 | N/A | N/A | \$1.3 | \$4.9 |
| Heifer | | | | | | | | | | |
| >1000 AU | \$0.9 | \$17.1 | \$3.4 | \$50.3 | \$1.7 | \$63.4 | N/A | N/A | \$2.5 | \$124.8 |
| 300-1000AU | \$3.0 | \$72.6 | \$6.7 | \$65.4 | \$4.8 | \$107.5 | N/A | N/A | \$5.7 | \$155.4 |
| Dairy | | | | | | | | | | |
| >1000 AU | \$0.6 | \$92.7 | \$3.2 | \$144.0 | \$3.2 | \$281.0 | N/A | N/A | \$46.3 | \$1,018 |
| 300-1000AU | \$2.8 | \$149.3 | \$6.2 | \$205.2 | \$8.9 | \$532.7 | N/A | N/A | \$54.8 | \$1,261 |
| Hog: GF | | | | | | | | | | |
| >1000 AU | \$0.0 | \$0.7 | \$0.0 | \$6.2 | \$0.1 | \$9.4 | \$0.1 | \$11.2 | \$0.1 | \$6.6 |
| 300-1000AU | \$0.4 | \$2.3 | \$0.7 | \$6.9 | \$5.4 | \$18.8 | \$0.5 | \$14.2 | \$1.6 | \$12.7 |
| Hog: FF | | | | | | | | | | |
| >1000 AU | \$0.0 | \$0.7 | \$0.0 | \$6.2 | \$0.1 | \$9.4 | \$0.1 | \$11.1 | \$0.1 | \$9.0 |
| 300-1000AU | \$0.4 | \$2.4 | \$0.7 | \$6.9 | \$5.3 | \$18.8 | \$0.5 | \$14.2 | \$1.5 | \$12.7 |
| Broilers | | | | | | | | | | |
| >1000 AU | \$0.01 | \$0.12 | \$0.01 | \$0.17 | \$0.03 | \$0.21 | \$0.01 | \$0.17 | \$0.02 | \$0.17 |
| 300-1000AU | \$0.01 | \$0.14 | \$0.01 | \$0.21 | \$0.05 | \$0.38 | \$0.01 | \$0.21 | \$0.04 | \$0.29 |
| Layer Wet | | | | | | | | | | |
| >1000 AU | \$0.01 | \$0.38 | \$0.01 | \$0.35 | \$0.15 | \$0.49 | \$0.01 | \$0.35 | \$0.02 | \$0.30 |
| 300-1000AU | \$0.04 | \$0.09 | \$0.04 | \$0.19 | \$0.37 | \$1.03 | \$0.42 | \$0.71 | \$0.10 | \$0.43 |
| Layer Dry | | | | | | | | | | |
| >1000 AU | \$0.01 | \$0.06 | \$0.01 | \$0.12 | \$0.01 | \$0.19 | \$0.01 | \$0.12 | \$0.01 | \$0.18 |
| 300-1000AU | \$0.02 | \$0.12 | \$0.02 | \$0.18 | \$0.04 | \$0.38 | \$0.02 | \$0.18 | \$0.03 | \$0.25 |
| Turkeys | | | | | | | | | | |
| >1000 AU | \$0.03 | \$0.21 | \$0.03 | \$0.32 | \$0.00 | \$0.46 | \$0.03 | \$0.32 | \$0.06 | \$0.37 |
| 300-1000AU | \$0.04 | \$0.25 | \$0.04 | \$0.48 | \$0.10 | \$0.85 | \$0.04 | \$0.48 | \$0.09 | \$0.57 |

Source: USEPA. Costs for Option 3 and Option 7 are calculated using April 4, 2002 engineering costs and assume an alternative AU thresholds for broiler and egg-laying operations; see also USEPA, 2002I—DCN 375086). N/A = “not applicable” since EPA does not consider housing of large animals in some sectors to be practicable.

Table 3-6b. Costs as a Share of Model CAFO Total Operating Costs (Minimum and Maximum), (\$1997).

| Sector/ Size Group | Option 1 | | Option 2 | | Option 3 | | Option 5 | | Option 7 | |
|-----------------------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Beef | | | | | | | | | | |
| >1000 AU | 0.0% | 11.1% | 0.5% | 10.8% | 0.2% | 13.3% | N/A | N/A | 0.2% | 29.4% |
| 300-1000AU | 0.4% | 6.0% | 0.8% | 7.6% | 0.6% | 11.9% | N/A | N/A | 0.7% | 12.8% |
| Veal | | | | | | | | | | |
| >1000 AU | 0.1% | 0.2% | 0.1% | 0.2% | 0.2% | 0.4% | N/A | N/A | 0.1% | 0.2% |
| 300-1000AU | 0.1% | 0.5% | 0.1% | 0.5% | 0.2% | 1.0% | N/A | N/A | 0.1% | 0.5% |
| Heifer | | | | | | | | | | |
| >1000 AU | 0.2% | 3.7% | 0.7% | 10.9% | 0.4% | 13.8% | N/A | N/A | 0.5% | 27.1% |
| 300-1000AU | 0.3% | 8.0% | 0.7% | 7.2% | 0.5% | 11.8% | N/A | N/A | 0.6% | 17.0% |
| Dairy | | | | | | | | | | |
| >1000 AU | 0.0% | 4.7% | 0.2% | 7.3% | 0.2% | 14.2% | N/A | N/A | 2.3% | 51.2% |
| 300-1000AU | 0.2% | 7.8% | 0.3% | 12.0% | 0.5% | 31.2% | N/A | N/A | 2.9% | 66.2% |
| Hog: GF | | | | | | | | | | |
| >1000 AU | 0.0% | 3.5% | 0.0% | 30.9% | 0.1% | 47.0% | 0.1% | 55.9% | 0.1% | 33.0% |
| 300-1000AU | 0.2% | 1.2% | 0.4% | 3.6% | 2.8% | 9.8% | 0.2% | 7.4% | 0.8% | 6.6% |
| Hog: FF | | | | | | | | | | |
| >1000 AU | 0.0% | 0.6% | 0.0% | 5.5% | 0.1% | 8.4% | 0.1% | 9.9% | 0.1% | 8.0% |
| 300-1000AU | 0.3% | 1.7% | 0.5% | 4.9% | 3.8% | 13.3% | 0.3% | 10.0% | 1.1% | 9.0% |
| Broilers | | | | | | | | | | |
| >1000 AU | 1.1% | 25.6% | 1.1% | 36.1% | 5.5% | 46.6% | 1.8% | 32.7% | 5.1% | 39.0% |
| 300-1000AU | 1.8% | 22.2% | 1.8% | 32.7% | 7.5% | 59.2% | 1.1% | 36.1% | 6.5% | 42.6% |
| Layer Wet | | | | | | | | | | |
| >1000 AU | 0.1% | 2.3% | 0.1% | 2.1% | 0.9% | 2.9% | 0.1% | 2.1% | 0.1% | 1.8% |
| 300-1000AU | 0.2% | 0.5% | 0.2% | 1.1% | 2.2% | 6.2% | 2.5% | 4.2% | 0.6% | 2.6% |
| Layer Dry | | | | | | | | | | |
| >1000 AU | 0.1% | 0.4% | 0.1% | 2.1% | 0.1% | 1.1% | 0.1% | 0.7% | 0.1% | 1.1% |
| 300-1000AU | 0.2% | 0.5% | 0.2% | 1.1% | 0.2% | 2.3% | 0.1% | 1.1% | 0.2% | 1.5% |
| Turkeys | | | | | | | | | | |
| >1000 AU | 0.2% | 1.2% | 0.2% | 1.9% | 0.0% | 2.7% | 0.2% | 1.9% | 0.3% | 2.1% |
| 300-1000AU | 0.6% | 3.5% | 0.6% | 6.7% | 1.4% | 11.8% | 0.6% | 6.7% | 1.3% | 7.9% |

Source: USEPA. Costs for Option 3 and Option 7 are calculated using April 4, 2002 engineering costs and assume an alternative AU thresholds for broiler and egg-laying operations; see also USEPA, 2002I—DCN 375086). N/A = “not applicable” since EPA does not consider housing of large animals in some sectors to be practicable.

3.3 ESTIMATED FINANCIAL EFFECTS ON EXISTING OPERATIONS (BAT ANALYSIS)

Following a brief review of the baseline financial conditions depicted in EPA's model CAFOs (Section 3.3.1), this section presents the financial effects of the regulations on CAFOs with more than 1,000 AU (Section 3.3.2). These results focus on two principal technology options (Option 1 and Option 2), as was done for estimated compliance costs in Section 3.2. Sections 3.3.3 and 3.3.4 show these results under alternative assumptions, including alternative cash flow calculations (Section 3.3.3) and estimates of CAFO closures under alternative assumptions of long-run market adjustment and cost-share assistance (Section 3.3.4). Section 3.3.5 provides additional information regarding other alternative regulatory options considered by the Agency during the development of the rule.

3.3.1 Baseline Financial Health of Model CAFOs

Based on financial data presented in Section 2 (see Tables 2-2 and 2-3), all representative model CAFOs, regardless of sector or size or production region, are considered to be financially healthy in the baseline before the impacts of the final regulations are considered. Using these data, all model CAFOs currently are estimated to have positive discounted cash flow and debt-to-asset ratios below the established benchmark value for this rule (depending on sector).²⁶ Post-regulatory impacts are measured against this baseline. EPA considers that negative cash flow or debt-to-asset ratios greater than the benchmark value in the impact analysis can be attributed to the compliance costs associated with the regulatory options considered.

3.3.2 Financial Effects on CAFOs under the Final Regulations

This section examines the impact on existing CAFOs with more than 1,000 AU to comply with the final ELG requirements for Best Available Technologies Economically Achievable (BATEA).

Table 3-7 presents the results of EPA's analysis of the estimated CAFO level financial effects in terms of the number of operations that will experience affordable, moderate, or stress impact due to the regulations. Results are shown both for Option 1 and Option 2. Results are shown by sector for operations with more than 1,000 AU only because these are the operations that would be subject to the ELG regulations. Operations with fewer than 1,000 AU would be instead subject to the BPJ of the permitting authority. Section 3.3.5 shows the results of alternative regulatory options assuming that operations with fewer than 1,000 AU would be subject to the ELG, which EPA considered in the 2001 Proposal.

For Option 1, the analysis indicates that, among all CAFOs with more than 1,000 AU in the veal, heifer, dairy, hog, turkey, and egg-laying sectors, the impacts due to this rule can be characterized as "Affordable" or "Moderate." Therefore, EPA considers this option to be economically achievable for existing facilities in these animal sectors. EPA estimates that a total of 15 existing CAFOs (less than 1 percent of all CAFOs with more than 1,000 AU) would experience financial stress and might be

²⁶As discussed in Section 2, EPA did adjust the available hog enterprise level data from USDA. Among the various reasons for this adjustment were concerns about how to assess impacts for this sector given that the reported data are unanalyzable in this framework (because of consistently negative cash flow calculations).

vulnerable to closure. By sector, EPA estimates that 12 beef operations (1 percent of affected beef CAFOs) and 3 broiler operations (less than 1 percent of affected broiler CAFOs) might close as a result of complying with the final regulations.

For Option 2, the analysis indicates that, among all CAFOs with more than 1,000 AU in the veal, dairy, turkey, and egg-laying sectors, the impacts due to this rule can be characterized as “Affordable” or “Moderate.” Therefore, EPA considers this option to be economically achievable for existing facilities in these animal sectors. (Moderate impacts might be incurred by operations in some sectors, but these impacts are not considered to result in facility closure.) In the beef cattle, heifer, hog, and broiler sectors, however, EPA’s analysis indicates that the final rule would cause some existing CAFOs to experience financial stress, making these operations vulnerable to facility closure. Across all sectors, EPA estimates that 285 existing CAFOs (about 4 percent of all all CAFOs with more than 1,000 AU) would experience financial stress and might be vulnerable to closure. By sector, EPA estimates that 49 beef operations (3 percent of affected beef CAFOs), 22 heifer operations (9 percent), 204 hog operations (5 percent), and 10 broiler operations (1 percent) might close as a result of complying with the final regulations.

These estimates of the number of potential CAFO closures are cumulative and reflect the results of both the farm level analysis and the enterprise level analysis. These estimated closure rates are generally consistent with the findings of economic achievability of previous effluent guidelines for other industrial point source categories. Based on the results of this analysis, EPA concludes that both Option 1 and Option 2 would be considered economically achievable for existing CAFOs.

These results are based on an analysis that does not consider the longer term effects on market adjustment and also available cost-share assistance from Federal and State farm conservation programs. EPA believes that such adjustments could lessen the economic impacts of the final regulations over time. Sections 3.3.5 show the results of this analysis under assumptions of long-run market adjustment and cost-share assistance.

As already discussed in Section 3.2, this report presents the results of two technology options where EPA has estimated the cost of land application based on nitrogen-based application rates only (Option 1) and also the cost of land application based on nitrogen-based application rates, except in those instances where EPA believes that phosphorus-based rates are likely to be appropriate (Option 2). Given that the final rule provides for appropriate flexibilities in the use of phosphorus-based rates, such as multi-year phosphorus application, EPA has not accounted for the potential costs savings resulting from these flexibilities in its analysis. As a result, the economic impacts presented here may be overestimated. Also, for the purpose of this analysis, EPA assumes that small business CAFOs with between 300 and 1,000 AU would incur costs similar to those estimated for CAFOs with more than 1,000 AU (although these smaller-sized operations will be subject to BPJ and not the ELG requirements under the revised NPDES requirements). These upper end cost estimates could, therefore, overstate the financial effects for this size category.

3.3.3 Sensitivity Analysis Under Alternative Cash Flow Calculations

This section presents the results of a separate sensitivity analysis where EPA calculates alternative cash flows based on the use of other accounting data as a proxy for capital replacement (discussed in more detail in Section 2.3.3).

Table 3-7. Financial Effects of the ELG on CAFOs (>1,000 AU), Option 1 and Option 2

| Sector | Number CAFOs (>1,000AU) | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--------------|-------------------------------|------------|----------|--------|-------------------------------|----------|--------|
| | | (Number) | | | (Percent of Total Operations) | | |
| ELG Option 1 | | | | | | | |
| Fed Cattle | 1,766 | 1,754 | 0 | 12 | 99% | 0% | 1% |
| Veal | 12 | 12 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 242 | 242 | 0 | 0 | 100% | 0% | 0% |
| Dairy | 1,450 | 1,232 | 218 | 0 | 85% | 15% | 0% |
| Hogs | 3,924 | 3,924 | 0 | 0 | 100% | 0% | 0% |
| Broilers | 1,632 | 1,334 | 294 | 3 | 82% | 18% | 0% |
| Layers - Dry | 729 | 729 | 0 | 0 | 100% | 0% | 0% |
| Layers - Wet | 383 | 383 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 388 | 388 | 0 | 0 | 100% | 0% | 0% |
| Total | 10,526 | 9,998 | 512 | 15 | 95% | 5% | 0% |
| ELG Option 2 | | | | | | | |
| Fed Cattle | 1,766 | 1,717 | 0 | 49 | 97% | 0% | 3% |
| Veal | 12 | 12 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 242 | 220 | 0 | 22 | 91% | 0% | 9% |
| Dairy | 1,450 | 1,019 | 431 | 0 | 70% | 30% | 0% |
| Hogs | 3,924 | 3,249 | 470 | 204 | 83% | 12% | 5% |
| Broilers | 1,632 | 1,032 | 590 | 10 | 63% | 36% | 1% |
| Layers - Dry | 729 | 729 | 0 | 0 | 100% | 0% | 0% |
| Layers - Wet | 383 | 383 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 388 | 388 | 0 | 0 | 100% | 0% | 0% |
| Total | 10,526 | 8,749 | 1,491 | 285 | 83% | 14% | 3% |

Source: USEPA. May not add due to rounding.

EPA's cash flow analysis uses net cash income estimates and does not consider noncash income and expenses. To address the question of whether EPA may have understated impacts because its discounted cash flow analysis does not include any allowance for depreciation or replacement of capital in its definition of cash flow, the Agency has conducted further sensitivity analysis using reported

accounting depreciation as a proxy for capital replacement to calculate alternative cash flow values for EPA's financial analysis.

For the purposes of this sensitivity analysis, EPA examines the sensitivity of the results of economic impact analysis under an alternative scenario where capital expenditures are set equal to accounting depreciation. These results are contrasted to results in EPA's main analysis, where capital replacement is not reflected as part of the Agency's cash flow calculation. This analysis is conducted at the farm level. Table 2-2 reflect reported depreciation amounts corresponding to financial data obtained for each model CAFO. These sources of financial data do not report estimated capital replacement.

Table 3-8 shows the results of this analysis. Based on this analysis, EPA has determined that the results of the economic impact analysis are not sensitive to the alternate assumptions regarding cash flow. The results of this analysis show that the number of estimated CAFO closures would not be substantially different if allowances for replacement of capital are made. Table 3-9 shows that under these alternative assumptions, the number of potential facility closures rises only slightly from 285 potential closures to 287 closures.

EPA recognizes that cash outlays for capital replacement and additions are required for a firm to remain in business and should be reflected in the cash flows used to assess economic impacts. However, EPA does not conclude from this analysis that accounting depreciation provides a reliable proxy for these continuing capital expenditures. Reported depreciation is a periodic accounting charge for capital assets acquired in the past, and it may be either larger or smaller than annual future capital expenditures for several reasons. Depreciation is based on historical cost, which might not equal the replacement cost of capital assets. Also, reported depreciation is based on various accounting and tax reporting conventions that might bear little resemblance to the actual economic life and consumption of capital assets. Finally, a firm's capital outlay decisions are influenced by the quality of its investment opportunities, the financial health of the enterprise, and general business conditions, which vary over time.

Table 3-8. Financial Effects on CAFOs: Changes to Cash Flow Calculations (Option 2)

| Sector | Number of CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|-------------|-----------------|---------------------------------|----------|--------|-------------------|----------|--------|
| | | Zero Depreciation | | | 100% Depreciation | | |
| | | (Number of Affected Operations) | | | | | |
| Fed Cattle | 1,766 | 1,717 | 0 | 49 | 1,715 | 0 | 51 |
| Veal | 12 | 12 | 0 | 0 | 12 | 0 | 0 |
| Heifer | 242 | 220 | 0 | 22 | 220 | 0 | 22 |
| Dairy | 1,450 | 1,019 | 431 | 0 | 1,019 | 431 | 0 |
| Hogs | 3,924 | 3,249 | 470 | 204 | 3,249 | 470 | 204 |
| Broilers | 1,632 | 1,032 | 590 | 10 | 1,032 | 590 | 10 |
| Layers: Dry | 729 | 729 | 0 | 0 | 729 | 0 | 0 |
| Layers: Wet | 383 | 383 | 0 | 0 | 383 | 0 | 0 |
| Turkeys | 388 | 388 | 0 | 0 | 388 | 0 | 0 |
| Total | 10,526 | 8,749 | 1,491 | 285 | 8,747 | 1,491 | 287 |

Source: USEPA. May not add due to rounding. See Table 2-8 for definitions: affordable, moderate, and stress.

3.3.4 Supplemental Analyses

Results presented in Section 3.3.1 do not consider the longer term effects on market adjustment and also available cost-share assistance from Federal and State farm conservation programs. EPA believes that such adjustments could lessen the economic impacts of the final regulations over time. To evaluate potential financial effects under such conditions, EPA has conducted further supplemental analysis to assess potential effects under two different scenarios. One scenario takes into consideration the effects of long-run market adjustment following implementation of the final regulations. This analysis is conducted using simulated changes in producer revenue given changes in market prices as depicted by EPA's market model, which uses estimates of price and quantity response in these markets. A second scenario takes into consideration potential cost-share assistance under Federal and State conservation programs, assuming that a portion of costs are covered by cost sharing subject to programmatic constraints. Given the uncertainty of whether CAFO income will rise in response to long-run market adjustment or whether available cost share dollars will effectively offset compliance costs at regulated CAFOs, EPA's analysis to determine whether the regulation is "economically achievable" does not rely on such assumptions as part of its regulatory analysis and therefore reflects the highest level of impacts projected. However, EPA presents the results of this analysis assuming both some degree of cost passthrough and no cost passthrough, as well as some degree of cost share assistance and no cost share assistance, along with the results of its lead analysis. Section 2.4.3 presents an overview of how EPA conducts these analyses and also discusses the Agency's decision not to incorporate such scenarios as part of its determination of economic achievability.

3.3.4.1 Market Impacts on Facility Income

For the purpose of this analysis, EPA examines regulatory impacts on producers in the livestock and poultry sectors under the assumption that they will experience increased revenues due to long-run market adjustment and resultant higher market prices. This analysis is conducted only for the beef, heifer, hog, and broiler sectors because these are the sectors where EPA's analysis shows there might be facility closures (under assumptions of no cost passthrough). Table 3-10 shows that, under assumptions of long-run market adjustment the number of potential facility closures is reduced from 210 closures (assuming no cost passthrough) to 1 closure in the beef sector (assuming partial cost passthrough).

In this analysis, EPA examines regulatory impacts on producers in the beef, heifer, and broiler sectors under the assumption that they will experience increased revenues due to the impact of the rule on market price. This revenue increase occurs because the effluent guideline increases production costs, shifting the supply curve for the market upward. Market price must then rise in the long run to ensure adequate supply; otherwise, producers will exit the market. The increase in unit price caused by the effluent guideline is illustrated in Figure C-1 in Appendix C of this report, where the shift in the supply curve is shown to equal to annualized compliance costs per unit sold (CC/Q) and the increase in market price is measured as $(P^1 - P^0)$.

In general, the magnitude of the price increase resulting from the revised regulations is largely determined by the price elasticities of supply and demand specified for the market model. Once the market model is specified, EPA can estimate the ratio of the change in price to the per unit compliance costs incurred: $(P^1 - P^0)/(CC/Q)$. In the beef and heifer sector, EPA found this ratio to be equal to 70.7 percent; in the broiler sector this ratio is equal to 68.7 percent. This means if the regulations cause farmers to incur compliance costs of \$1.00 per head of cattle, for example, the resulting decrease in cattle supply causes the market price to increase by about \$0.71 per head (see Section 2.4.3 for details).

Conceptually, applying this impact of the ELG on facility revenues to the DCF analysis is straightforward. In its DCF analysis, EPA (1) calculates the post-regulatory cash flow for each year of project life by subtracting operating expenses and compliance costs from operating revenues, (2) discounts the result according to project year, and then (3) sums the stream of post-regulatory discounted cash flows over the entire life of the project. Thus, for each year of the project's life, EPA calculates (in simplified form) post-regulatory cash flow as equal to market price multiplied by the number of units sold by the facility (facility revenues) minus operating costs and compliance costs. As a conservative estimate, EPA first performs its DCF analysis assuming that equilibrium market price is unchanged by the rule (i.e., market price is P^0 in Figure C-1). In this analysis, EPA adjusts facility revenues to reflect the increase in market price resulting from the ELG (market price is P^1 in Figure C-1 in Appendix C). See Appendix C of this report for more information.

Table 3-9 shows the results of the supplemental analysis assuming facility revenues reflect the increase in market price resulting from the final regulations. Only the fed cattle, heifer, hog, and broiler sectors are analyzed because CAFOs with more than 1,000 AU in the other sectors would be able to absorb costs associated with the final rule. As the table shows, the compliance costs would be affordable for virtually all CAFOs in these sectors. Only one beef operation would experience financial stress. All other operations in these sectors would be able to absorb the estimated compliance costs under an assumption that market prices would increase in response to regulatory revisions.

Table 3-9. Financial Effects to CAFOs: Partial Cost Passthrough (Option 2)

| Sector | Number of CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--------------|-----------------|---------------------------------|----------|--------|--------------------------|----------|--------|
| | | Zero Cost Passthrough | | | Partial Cost Passthrough | | |
| | | (Number of Affected Operations) | | | | | |
| Fed Cattle | 1,766 | 1,717 | 0 | 49 | 1,765 | 0 | 1 |
| Veal | 12 | 12 | 0 | 0 | ND | ND | ND |
| Heifer | 242 | 220 | 0 | 22 | 242 | 0 | 0 |
| Dairy | 1,450 | 1,019 | 431 | 0 | ND | ND | ND |
| Hogs | 3,924 | 3,249 | 470 | 204 | 3,720 | 204 | 0 |
| Broilers | 1,632 | 1,032 | 590 | 10 | 1,632 | 0 | 0 |
| Layers - Wet | 383 | 729 | 0 | 0 | ND | ND | ND |
| Layers - Dry | 729 | 383 | 0 | 0 | ND | ND | ND |
| Turkeys | 388 | 388 | 0 | 0 | ND | ND | ND |
| Total | 10,526 | 8,749 | 1,491 | 285 | 7,359 | 204 | 1 |

Source: USEPA. May not add due to rounding. See Table 2-8 for definitions: affordable, moderate, and stress.

3.3.4.2 Cost-Share Assistance

For the purpose of this analysis, EPA examines regulatory impacts on producers in the livestock and poultry sectors assuming that some portion of the compliance costs will be incurred by Federal and/or State cost-share assistance. This analysis is conducted only for the beef, heifer, hog, and broiler sectors because these are the sectors where EPA's analysis shows there are potential facility closures (under assumptions of no cost sharing). Although other sectors may also receive cost share assistance, EPA has not modeled the effect of cost-share assistance on these types of operations because no stress impacts are measured in these sectors.

For this analysis, EPA assumes that 50 percent of the capital costs of compliance in these sectors would be covered by cost-share assistance. EPA reduced the capital cost of compliance by 50 percent for each of the representative model CAFOs and ran the same economic model as that used for the main analysis, with all other assumptions held constant.

Under an assumption that 50 percent of the capital costs are covered by cost-share assistance, EPA's analysis would assume that total cost sharing for operations with more than 1,000 AU in these four sectors would amount to roughly \$20 million annually (1997 dollars). The majority of operations (about 90 percent) would receive less than \$10,000 each per year, with a smaller share of operations receiving up to \$30,000 each per year in the cattle and broiler sectors. Assuming changes under the 2002 Farm Bill legislation are implemented and there are resulting changes to USDA's farm conservation programs, EPA believes that these are reasonable assumptions for the purposes of conducting a sensitivity analysis.

Table 3-10 shows that, under assumptions of partial cost share assistance (assumed for this analysis to cover 50 percent of the capital expenditure to comply with the revised regulations), the number of potential facility closures is reduced only somewhat from 285 closures to 261 closures (assuming partial cost share assistance). These estimated closures are comprised of 43 beef, 11 heifer, 204 hog, and 3 broiler operations. Among the reasons why these closure results indicate little change assuming cost-share assistance is that EPA's approach applies cost-sharing to estimated capital costs only, whereas the bulk of incurred compliance costs are likely to be annual operating and maintenance costs associated with the land application requirements of the rule, including nutrient management and off-site hauling of excess manure.

3.3.5 Comparison with the Proposed Regulations

EPA considered various alternative regulatory options during the development of this rulemaking. For the Agency's Option Selection process for the final regulations, EPA evaluated these and other options. This section presents the results of these analyses.

Table 3-11 shows the results of EPA's analysis of these alternative options in terms of the number of operations estimated to experience financial stress under these options and that would be vulnerable to facility closure. These results are based on an analysis that does not consider the longer-term effects on market adjustment and also available cost-share assistance from Federal and State farm conservation programs. Note that estimated costs for Option 3 and Option 7 are calculated using a previous set of engineering costs (April 4, 2002) and also assume an alternative AU thresholds for broiler and egg-laying operations (where 1,000 AU would equal 100,000 broiler and egg-laying operation with dry manure systems). Also, EPA does not estimate costs or financial impacts on the cattle and dairy

Table 3-10. Financial Effects on CAFOs: Partial Cost-Share Assistance (Option 2)

| Sector | Number of CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--------------|-----------------|---------------------------------|----------|--------|---------------------------|----------|--------|
| | | Zero Cost Passthrough | | | 50% Cost Share Assistance | | |
| | | (Number of Affected Operations) | | | | | |
| Fed Cattle | 1,766 | 1,717 | 0 | 49 | 1,723 | 0 | 43 |
| Veal | 12 | 12 | 0 | 0 | ND | ND | ND |
| Heifer | 242 | 220 | 0 | 22 | 231 | 0 | 11 |
| Dairy | 1,450 | 1,019 | 431 | 0 | ND | ND | ND |
| Hogs | 3,924 | 3,249 | 470 | 204 | 3,257 | 463 | 204 |
| Broilers | 1,632 | 1,032 | 590 | 10 | 1,485 | 144 | 3 |
| Layers - Wet | 383 | 729 | 0 | 0 | ND | ND | ND |
| Layers - Dry | 729 | 383 | 0 | 0 | ND | ND | ND |
| Turkeys | 388 | 388 | 0 | 0 | ND | ND | ND |
| Total | 10,526 | 8,749 | 1,491 | 285 | 6,696 | 607 | 261 |

Source: USEPA. May not add due to rounding. See Table 2-8 for definitions: Affordable, Moderate, and Stress.

sectors under Option 5 because the Agency does not consider housing of large animals under this option to be practicable in these sectors).

Among operations with more than 1,000 AU, the expected potential CAFO closures range from about 20 operations to 1,700 operations, depending on the technology option

Table 3-11 also presents economic impacts on all operations with between 300 and 1,000 AU (more than 33,100 operations) and not just those operations that are expected to be *defined* as CAFOs under the regulations (about 4,500 operations). The reason EPA presents its analysis for all operations in this size category is that the Agency had considered extending the ELG regulations to operations in this size category in the 2001 Proposal. As shown in the table, applying these requirements to all operations with between 300 and 1,000 AU could potentially affect a large number of operations, ranging from about 200 operations²⁷ to nearly 11,000 operations, depending on the regulatory option.

Despite data and analytical changes made to EPA's financial analysis, as presented in both of EPA's Notices (see: USGAO, 2001b, 66 FR 58556 and USGAO, 2002, 67 FR 48099), the results of the Agency's analyses for these various regulatory options did not change much compared to that evaluated and presented for the 2001 Proposal. In particular, these results show that the inclusion of an enterprise level financial analysis does not significantly alter the results of EPA's overall analysis (since the enterprise level results do not always differ substantially from the farm level results across all sectors).

²⁷Since EPA does not estimate costs or financial impacts on the cattle and dairy sectors under Option 5, EPA would assume total closures under either Option 1 or Option 2 for those sectors.

The use of alternative financial data overall in the beef and hog sectors, compared to that used for the proposal, does result in substantial changes to EPA's analysis results compared to that conducted for the proposed rule (although more beef operations but fewer hog operations are shown to experience financial stress from estimated compliance costs). EPA's economic results, however, are not driven solely by changes to EPA's financial models but are also driven by underlying changes to the Agency's engineering cost models. As discussed in the 2001 Notice, EPA has expanded the range of cost estimates per representative farm to account for variability across operations based on expected capital and management improvements needed (see 66 FR 58572-58573). The cumulative effect of each of these data and modeling refinements results in EPA's cost and financial models consistently showing that certain types of business operations in the baseline—namely, operations without sufficient land base for land application of manure that may incur high offsite transfer costs, high-technology and management needs, along with higher-cost, low-performing businesses—are more vulnerable to facility closure.

3.4 ESTIMATED FINANCIAL EFFECTS TO NEW OPERATIONS (NSPS ANALYSIS)

This section examines the impacts to new facilities to comply with the final ELG requirements for New Source Performance Standards (NSPS). For this analysis, EPA evaluated impacts on new source CAFOs by comparing the costs borne by new source CAFOs to those estimated for existing sources. That is, if the expected cost to new sources is similar to or less than the expected cost borne by existing sources (and that cost is considered economically achievable for existing sources), EPA considers that the regulations for new sources do not impose requirements that might grant existing operators a cost advantage over new CAFO operators and further determines that the NSPS is affordable and does not present a barrier to entry for new facilities. In general, the costs to new sources from NSPS requirements are lower than the costs for existing sources because new sources are able to apply control technologies more efficiently than existing sources, which may incur high retrofit costs. Not only will new sources be able to avoid the retrofit costs incurred by existing sources, new sources might also be able to avoid the other various control costs facing some existing producers through careful site selection. The requirements promulgated in the final regulation do not give existing operators a cost advantage over new CAFO operators; therefore, the new source performance standards do not present a barrier to entry for new facilities.

Examples of avoided retrofit costs and costs of total containment systems and waste management, including land application, for both existing and new sources, are provided in Section 4 of the preamble. As discussed in the preamble, EPA evaluated economic impacts to new source CAFOs by comparing the costs borne by new source CAFOs to those estimated for existing sources. That is, if the expected cost to new sources is similar to or less than the expected cost borne by existing sources (and that cost was considered economically achievable for existing sources), then EPA considers the regulations for new sources not to impose requirements that might grant existing operators a cost advantage over new CAFO operators and further determines that the NSPS is affordable and does not present a barrier to entry for new facilities. In general, costs to new sources for complying with a given set of regulatory requirements are lower than the costs for existing sources to comply with the same requirements since new sources are able to apply control technologies more efficiently than existing sources that may incur high retrofit cost. New source CAFOs will be able to avoid the retrofit costs that will be incurred by existing sources. For example, the cost of a model total containment system for swine that would meet the no discharge requirement (e.g., incremental cost of deep pit swine house, including land application) typically is less than the cost for an existing source to retrofit water intensive lagoon-based systems that are exposed to precipitation. Among the primary reasons for the capital cost

Table 3-11. Model CAFOs where Compliance Costs result in Financial Stress (Alternative Options)

| Sector | Total No. | Option 1 | Option 2 | Option 3 ¹ | Option 5 | Option 7 ¹ |
|---------------------------------------|---------------|------------|------------------|-----------------------|------------|-----------------------|
| All Defined CAFOs >300 AU | | | | | | |
| Beef | 4,448 | 133 | 216 | 2,885 | N/A | 2,535 |
| Veal | 736 | 0 | 0 | 0 | N/A | 0 |
| Heifers | 299 | 38 | 63 | 322 | N/A | 213 |
| Dairy | 7,230 | 0 | 0 | 504 | N/A | 1,888 |
| Hogs | 13,825 | 0 | 204 | 990 | 665 | 674 |
| Broilers | 12,034 | 3 | 19 | 8,293 | 108 | 2,732 |
| Layers | 3,082 | 0 | 0 | 0 | 0 | 0 |
| Turkeys | 2,003 | 0 | 0 | 0 | 0 | 0 |
| Total | 43,657 | 174 | 502 | 12,994 | 773 | 8,042 |
| All Defined CAFOs >1,000 AU | | | | | | |
| Beef | 1,766 | 12 | 49 | 340 | N/A | 63 |
| Veal | 12 | 0 | 0 | 0 | N/A | 0 |
| Heifers | 242 | 0 | 22 | 71 | N/A | 58 |
| Dairy | 1,450 | 0 | 0 | 3 | N/A | 393 |
| Hogs | 3,924 | 0 | 204 ¹ | 990 | 665 | 674 |
| Broilers | 1,632 | 3 | 10 | 699 | 84 | 541 |
| Layers | 1,112 | 0 | 0 | 0 | 0 | 0 |
| Turkeys | 388 | 0 | 0 | 0 | 0 | 0 |
| Total | 10,526 | 15 | 285 | 2,103 | 749 | 1,729 |
| All Defined CAFOs 300-1000 AU | | | | | | |
| Beef | 2,682 | 121 | 167 | 2,545 | N/A | 2,472 |
| Veal | 57 | 0 | 0 | 0 | N/A | 0 |
| Heifers | 724 | 38 | 41 | 251 | N/A | 155 |
| Dairy | 5,780 | 0 | 0 | 502 | N/A | 1,495 |
| Hogs | 9,901 | 0 | 0 | 0 | 0 | 0 |
| Broilers | 10,402 | 0 | 10 | 7,594 | 24 | 2,191 |
| Layers | 1,970 | 0 | 0 | 0 | 0 | 0 |
| Turkeys | 1,615 | 0 | 0 | 0 | 0 | 0 |
| Total | 33,131 | 159 | 218 | 10,892 | 24 | 6,313 |

Source: USEPA. Costs for Option 3 and Option 7 are calculated using April 4, 2002 engineering costs and assume an alternative AU thresholds for broiler and egg-laying operations; see also USEPA, 2002I—DCN 375086).

N/A = “not applicable” since EPA does not consider housing of large animals in some sectors to be practicable.

This table also reflects impacts on all operations 300-1000 AU and not just operations *defined* as CAFOs only.

difference for a new source with total containment is that it does not include an impoundment lagoon, and it experiences reduced operating costs because it handles less waste with substantially lower water and higher solids content than a water-intensive lagoon-based system. New sources may be able to avoid many of the other control costs facing some existing producers through careful site selection, such as choosing to locate at a site with sufficient available land nearby for applying manure. Furthermore, other technologies are available to new sources, that have been implemented by existing sources, that are also capable of achieving the no discharge standard. The preamble of the final rule provides further discussion of these and other technologies. Since the new source requirements for beef and dairy operations are the same as the corresponding existing source requirements, EPA concludes that the NSPS requirements promulgated today do not present a barrier to entry for new facilities. For hog, poultry, and veal operations, where the new source requirements are more stringent than the existing source requirements, EPA concludes that the NSPS requirements do not pose a barrier to entry because of the currently widespread use of animal confinement practices and waste management technologies that can comply with the zero discharge standard, and because these total containment technologies and practices are less costly to implement than water-intensive systems (e.g., such as water flush waste management) that are exposed to precipitation.

As part of its preliminary analysis, EPA costed for zero discharge technologies and showed that these would pose no barrier to entry (see Section 3.4.1 and Section 3.4.2 below); now that operations can choose an alternative option that might be cheaper to implement, EPA believes there is even less likelihood that there is a barrier to entry. More information is provided in the *Development Document* and related cost supporting the final regulations (USEPA, 2002). All new source technologies are widely demonstrated and available in each animal sector.

3.4.1 Beef and Dairy Subcategories

As part of a preliminary analysis, EPA evaluated costs for new beef and dairy operations with more than 1,000 AU. These costs compare the cost of land application requirements for both new and existing source under similar technology requirements reflected by costs estimated for Option 2. The land application requirements for new sources would be identical to those established for existing sources.

EPA's analysis indicates that requiring Option 2 for new sources for the beef and dairy subcategories would not create a barrier to entry because the estimated costs for new sources are less expensive than the BAT costs for existing sources. This determination is based on a comparison of the costs of Option 2 BAT to the costs of Option 2 NSPS on a model-by-model basis. These results are shown in Table 3-12. Estimated Option 2 NSPS costs for new beef and dairy operations are lower than Option 2 BAT costs since they do not include retrofitting costs that would be incurred by existing sources. EPA's comparison of the estimated NSPS and BAT costs shows that the new source costs for some model facilities were estimated to be more than 20 percent lower than those for existing facilities. Furthermore, these requirements are "economically achievable" to existing facilities (see Section 3.3). Therefore, EPA concludes that the NSPS requirements should pose no barrier to entry to new business in these sectors. These cost estimates are available in the record.

3.4.2 Swine, Veal, and Poultry Subcategories

As part of a preliminary analysis, EPA evaluated costs for new swine, veal, and poultry operations with more than 1,000 AU. These costs would require that all discharges of process wastewater from the production area are prohibited and there is no allowance for discharges due to large rainfall events (Option 5). Land application requirements would be similar to those established for existing sources.

EPA's analysis indicates that requiring Option 5 for new sources for the hog, veal, and poultry subcategories would not create a barrier to entry since the estimated costs for new sources are the same as (for veal) or less expensive than the BAT costs for existing sources. This determination is based on a comparison of the costs of Option 2 BAT to the costs of Option 5 NSPS on a model-by-model basis. These results are shown in Table 3-13 (results are not shown for veal, since the costs are the same for NSPS and BAT). Estimated Option 5 NSPS costs for new swine and poultry operations are lower than Option 2 BAT costs since they do not include retrofitting costs that would be incurred by existing sources. EPA's comparison of the estimated NSPS and BAT costs shows that the new source costs for some model facilities were estimated to be more than 50 percent lower than those for existing facilities. Furthermore, these requirements are "economically achievable" to existing facilities (see Section 3.3). Therefore, EPA concludes that the NSPS requirements should pose no barrier to entry to new business in these sectors. These cost estimates are available in the record.

Table 3-12. Percent Difference in Costs between NSPS and BAT Costs, Beef and Dairy Sectors

| Sector | Facility Size | Percent Difference |
|-------------------|---------------|--------------------|
| Fed Cattle | M1 | -14% to -21% |
| | M2 | -13% to -28% |
| | M3 | -12% to -27% |
| | L1 | -10% to -18% |
| | L2 | -9% to -15% |
| Dairy | M1 | -1% to -19% |
| | M2 | -0.3% to -21% |
| | M3 | -0.7% to -14% |
| | L1 | -0.1% to -23% |
| Heifers | M1 | -21% to -37% |
| | M2 | -21% to -29% |
| | M3 | -17% to -27% |
| | L1 | -15% to -22% |

Source: USEPA. Costs for BAT and NSPS Option 2 are calculated using April 4, 2002 engineering costs. Where percentages are negative, NSPS costs are less expensive than the BAT costs. See Table 2-1 for CAFO model definitions. Ranges shown are by region and reflect the average land availability and technology needs categories.

Table 3-13. Percent Difference between NSPS & BAT Costs, Hog and Poultry Sectors

| Sector | Facility Size | Percent Difference |
|-------------------|----------------------|---------------------------|
| Hog-GF | M1 | -4% to -12% |
| | M2 | -4% to -16% |
| | M3 | -3% to -18% |
| | L1 | -7% to -15% |
| | L2 | -6% to -12% |
| Hog-FF | M1 | -4% to -11% |
| | M2 | -4% to -15% |
| | M3 | -3% to -17% |
| | L1 | -8% to -15% |
| | L2 | -6% to -12% |
| Layers-Dry | M1 | -42% to -43% |
| | M2 | -44% to -46% |
| | M3 | -34% to -36% |
| | L1 | -55% to -58% |
| | L2 | -58% to -63% |
| Layers-Wet | M3 | -60% |
| | L1 | -92% |
| Broilers | M1 | -22% to -59% |
| | M2 | -24% to -65% |
| | M3 | -26% to -70% |
| | L1 | -28% to -74% |
| | L2 | -34% to -81% |
| Turkeys | M1 | -33% to -36% |
| | M2 | -41% to -45% |
| | M3 | -40% to -44% |
| | L1 | -50% to -56% |

Source: USEPA. Costs for BAT and NSPS Option 2 are calculated using April 4, 2002 engineering costs. Where percentages are negative, NSPS costs are less expensive than the BAT costs. See Table 2-1 for CAFO model definitions. Ranges shown are by region and reflect the average land availability and technology needs categories.

3.4.1 Comparison with the Proposed Regulations

Table 3-14 compares the Agency's preliminary aggregate, average costs to new sources to those estimated for existing source, across a range of regulatory options considered by EPA. For the 2001 Proposal, these costs reflect new source requirements set forth in the proposal would have required phosphorous-based land application requirements with the added requirements of ground water controls where there is a direct hydrologic connection (Option 3, all sectors) and also total containment from the production area with no exception for a storm event (Option 5, hogs and poultry only). This proposed option is listed in Table 3-14 as the "Proposed Option 3/5 ." These proposed requirements would have applied both to new operations with more than 1,000 AU and to new operations with less than 1,000 AU that are defined as CAFOs. EPA did not consider a total containment option for the cattle and dairy sectors since this was deemed impracticable and not affordable.

As shown in the table, both alternative Option 1 and Option 2 would likely not pose a barrier to entry to new operations since the average NSPS cost is estimated to be less than or equivalent to the BAT costs (and these costs are determined to be economically achievable for existing operations; see Section 3.3). To determine "no barrier to entry" for the other alternative regulatory options that EPA considered for new sources (Option 3, Option 7, and Option 5 for some sectors), the Agency would need to conduct additional analysis before making such a determination. As shown, although the NSPS costs are generally lower than the estimated BAT costs, it is unclear whether imposing similar requirements for existing sources would be economically achievable for those operations or that these costs would not pose a barrier to entry to new operations.

Table 3-14: Facility Level Cost Comparison - New versus Existing Sources (>1000 AU)

| Sector | Estimated NSPS Costs | | | Estimated BAT Costs | | |
|-----------------|----------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|
| | Proposal Option 3/5 | P-based Standards Option 2 | P-based & Timing Option 7 | N-based Standards Option 1 | P-based Standards Option 2 | P-based & Timing Option 7 |
| Cattle | \$8,000 | \$5,500 | \$10,700 | \$4,700 | \$9,200 | \$16,500 |
| Dairy | \$15,400 | \$13,300 | \$109,100 | \$30,600 | \$44,900 | \$331,000 |
| Hog | \$5,700 | \$5,700 | \$5,700 | \$7,700 | \$18,200 | \$20,000 |
| Broilers | \$5,800 | \$5,700 | \$5,700 | \$11,900 | \$13,900 | \$13,900 |
| Layers | \$7,600 | \$7,600 | \$7,600 | \$14,200 | \$21,500 | \$21,500 |
| Turkeys | \$16,100 | \$16,100 | \$16,100 | \$20,900 | \$30,800 | \$30,800 |

Source: USEPA. Costs for BAT and NSPS Option 2 are calculated using April 4, 2002 engineering costs.

3.5 MARKET IMPACTS

This section the results of EPA's market model to predict impacts of the final regulations on consumer and farm level price and quantity. The market model results also form the basis for further projecting changes to national employment, national economic output, and regional employment. EPA

measures economic impacts on the livestock and poultry sectors (direct effects), on industries that provide goods and services to livestock and poultry producers (indirect effects) and from associated expenditures of income earned in direct and indirect activities (induced effects). EPA also predicts impacts on U.S. trade. Section 3.5.1 presents the results of EPA's analysis across all subcategories; Section 3.5.2 presents the results for each individual subcategory (cattle, dairy, hog, and poultry subcategories).

3.5.1 Market Analysis Results Across All Subcategories

This section presents the results of EPA's market model analysis across all subcategories. The results presented in this section are based on the aggregate compliance costs that EPA estimated for both CAFOs with more than 1,000 AU to comply with the effluent guideline revisions and for CAFOs with between 300 and 1,000 AU, if defined as a CAFO, to comply with the NPDES permitting requirements. Results are shown both for Option 1 and Option 2. These market effects are estimated based on estimated regulatory costs presented in Table 3-3.

3.5.1.1 Commodity Prices and Quantities

EPA's market model predicts that the final regulations will not result in significant industry-level changes in production and prices. Predicted changes in animal production might raise producer prices, as the market adjusts to the final regulatory requirements. For all sectors, EPA estimates that farm level prices will rise by less than one percent of pre-regulation baseline prices (Table 3-15). At the retail level, EPA expects that the final regulations will not have a substantial impact on overall production or consumer prices for value-added meat, eggs, and fluid milk and dairy products. EPA estimates that retail price increases resulting from these regulations will also be less than one percent of baseline prices in all sectors (Table 3-16). At the retail level, EPA expects that the final rule will not have a substantial impact on overall production or consumer prices for value-added meat, eggs, and fluid milk and dairy products. EPA estimates that retail price increases resulting from this rule will be less than one percent of baseline prices in all sectors, averaging below the rate of general price inflation for all foods. In terms of retail level price changes, EPA estimates that poultry and red meat prices will rise about one cent per pound. EPA also estimates that egg prices will rise by about one cent per dozen and that milk prices will rise by about one cent per gallon.

Tables 3-15 and 3-16 show predicted farm and retail price changes, as both absolute value and as a percentage of pre-regulation baseline price levels. These economic effects reflect changes to both the effluent guideline regulation and the NPDES permit regulation. For comparison purposes, the average annual percentage change in price from 1990 to 1998 is provided. In all cases, the percent change in price attributable to the regulation is well within the normal year-to-year variability of prices for these products.

Table 3-17 summarizes the forecast reductions in farm level production, following a shift in the supply curve caused by compliance. As shown, predicted quantity reductions are less than two-tenths of one percent of pre-regulation production levels for all sectors. Other than export and import changes, quantity changes at the retail level (not shown) are expected to be directly proportional to changes at the farm level because the model assumes a fixed-proportions production process.

Table 3-15. Post-Compliance Farm Level Price Changes

| | Beef | Dairy | Hogs | Broilers | Layers | Turkeys |
|---------------------------------------|--------------------|-------|-------|-------------|--------------|-------------|
| | (\$/hundredweight) | | | (cents/lb.) | (cents/doz.) | (cents/lb.) |
| Option 1 | | | | | | |
| 1997 Price | 66.09 | 13.38 | 54.30 | 37.00 | 69.80 | 40.10 |
| Change in Price | 0.03 | 0.05 | 0.02 | 0.04 | 0.17 | 0.05 |
| Percent Change in Price | 0.05 | 0.34 | 0.04 | 0.11 | 0.24 | 0.13 |
| Avg. Annual Change (%) (1990-1998) | 4.56 | 7.95 | 15.24 | 5.74 | 11.45 | 4.37 |
| Option 2 | | | | | | |
| 1997 Price | 66.09 | 13.38 | 54.30 | 37.00 | 69.80 | 40.10 |
| Change in Price | 0.13 | 0.08 | 0.09 | 0.04 | 0.22 | 0.07 |
| Percent Change in Price | 0.19 | 0.61 | 0.17 | 0.12 | 0.31 | 0.18 |
| Avg. Annual Change (%) (1990-1998) | 4.56 | 7.95 | 15.24 | 5.74 | 11.45 | 4.37 |

Source: USEPA, except historical data (pre-regulatory average price and average annual change data) that are from USDA/ERS, 1999c, 1998b; USDA/WAOB, 1999, 2001; and NCBA, 2000.

Table 3-16. Post-Compliance Retail Level Price Changes

| | Beef | Dairy | Hogs | Broilers | Layers | Turkeys |
|---------------------------------------|-----------------|----------------|-----------------|--------------------|---------------------|--------------------|
| | (\$/lb.) | (index) | (\$/lb.) | (cents/lb.) | (cents/doz.) | (cents/lb.) |
| Option 1 | | | | | | |
| 1997 Price | 2.80 | 145.50 | 2.45 | 151.00 | 106.00 | 105.10 |
| Change in Price | 0.001 | 0.45 | 0.000 | 0.04 | 0.17 | 0.05 |
| Percent Change in Price | 0.02 | 0.31 | 0.01 | 0.03 | 0.16 | 0.05 |
| Avg. Annual Change (%) (1990-1998) | 2.30 | 2.43 | 5.07 | 2.99 | 7.17 | 2.39 |
| Option 2 | | | | | | |
| 1997 Price | 2.80 | 145.50 | 2.45 | 151.00 | 106.00 | 105.10 |
| Change in Price | 0.002 | 0.81 | 0.001 | 0.04 | 0.22 | 0.07 |
| Percent Change in Price | 0.09 | 0.56 | 0.05 | 0.03 | 0.20 | 0.07 |
| Avg. Annual Change (%) (1990-1998) | 2.30 | 2.43 | 5.07 | 2.99 | 7.17 | 2.39 |

Source: USEPA, except historical data (pre-regulatory average price and average annual change data) that are from USDA/ERS, 1999c, 1998b; USDA/WAOB, 1999, 2001; and NCBA, 2000.

EPA uses the estimated production changes, multiplied by the appropriate per-unit market price, to compute the overall change in market value associated with complying with the final regulations. The overall change in market value is an input to EPA's input-output analysis framework, which allows EPA to compute changes in employment and economic output after compliance.

As demonstrated by the results in these tables, there are only very minor differences in the estimated results between the two regulatory options presented here (Option1 and Option 2).

Table 3-17. Post-Compliance Farm Production Changes

| | Beef | Dairy | Hogs | Broilers | Layers | Turkeys |
|----------------------------|------------------|---------|--------|----------|-------------|-------------|
| | (million pounds) | | | | (mil. doz.) | (mil. lbs.) |
| Option 1 | | | | | | |
| 1997 Quantity | 47,967 | 156,100 | 23,542 | 27,551 | 6,473 | 5,412 |
| Change in Quantity | 9 | 145 | 3 | 3 | 1 | 1 |
| Percent Change in Quantity | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Option 2 | | | | | | |
| 1997 Quantity | 47,967 | 156,100 | 23,542 | 27,551 | 6,473 | 5,412 |
| Change in Quantity | 39 | 259 | 11 | 3 | 1 | 2 |
| Percent Change in Quantity | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |

Source: USEPA, except historical data (pre-regulatory quantity data) that are from USDA/ERS, 1998a, and 1998b; USDA/WAOB, 1999; and Putnam and Allshouse, 1999.

3.5.1.2 Aggregate Employment and National Economic Output

EPA does not expect the final regulations to cause significant changes in aggregate employment or national economic output as measured by Gross Domestic Product (GDP). EPA expects, however, that there will be losses in employment and economic output associated with decreases in animal production due to rising compliance costs. These losses are estimated throughout the entire economy, using available modeling approaches, and are not attributable to the regulated community only. This analysis also does not adjust for offsetting activity in other parts of the economy that may be stimulated as a result of the final regulations, such as the construction and farm services sectors.

Employment losses are measured in full-time equivalents (FTEs)²⁸ per year nationwide. These losses are associated with decreases in commodity production in response to higher compliance costs (Table 3-18). Predicted changes in aggregate employment are measured in terms of both direct and indirect/induced employment.²⁹

²⁸ One FTE is equivalent to 2,080 hours of labor.

²⁹ *Direct* employment measures the number of jobs related to production and processing, including workers engaged in the manufacture of agricultural inputs and their suppliers. Other *indirect* or *induced* employment provides a broader measure of industry-related employment and includes workers throughout the

Table 3-18. Post-Compliance Changes in Total National Employment (FTEs)

| Option | Beef | Dairy | Hogs | Poultry | Total ^{a/} |
|--|---------|---------|---------|---------|---------------------|
| Option 1 | | | | | |
| Total Baseline Direct ^{a/} Farm Employment | 336,700 | 483,800 | 195,900 | 71,800 | 1,088,200 |
| Direct Employment | 113 | 370 | 37 | 131 | 651 |
| Direct Wholesale/ Processing Employment | 16 | 15 | 10 | 20 | 60 |
| Consumer/Indirect/ Induced Employment | 528 | 2,020 | 207 | 666 | 3,421 |
| Total Change | 657 | 2,404 | 254 | 817 | 4,133 |
| Option 2 | | | | | |
| Total Baseline Direct ^{a/} Farm Employment | 336,700 | 483,800 | 195,900 | 71,800 | 1,088,200 |
| Direct Employment | 476 | 660 | 149 | 159 | 1,444 |
| Direct Wholesale/ Processing Employment | 66 | 26 | 40 | 24 | 156 |
| Consumer/Indirect/ Induced Employment | 2,218 | 3,603 | 832 | 806 | 7,460 |
| Total Change | 2,759 | 4,289 | 1,021 | 990 | 9,059 |

Source: USEPA's market model results, in conjunction with RIMS II multipliers (USDC, 1997b). Totals may not add due to rounding and may include double counting because each sector is modeled separately.

^{a/} Total farm employment is updated by EPA from 1990 estimates by Abel, Daft & Earley (1993) to account for changes between 1990 and 1997 (Council of Economic Advisors, 2000). Estimates are allocated by sector based on its share of annual farm revenue (USDA/NASS, 1999a) and exclude employment at cattle grazing operations. Processing sector employment is from the 1997 Census of Manufactures (USDC, 1999a) and is, in some cases, allocated to individual sectors based on farm sector employment proportions. See Section 2.5.3 of the Proposal EA (USEPA, 2001a). Total employment in 1997 was 129.6 million (Council of Economic Advisors, 2000).

EPA estimates of the reduction in total employment across all sectors to range from about 4,100 jobs lost (Option 1) to about 9,100 jobs lost (Option 2). Table 3-18. This projected change is modest when compared to total national employment, estimated at about 129.6 million jobs in 1997. EPA estimates of the aggregate reduction in national economic output range from about \$400 million (Option 1) to about \$900 million (Option 2). Table 3-19. This projected change is also modest when compared to total GDP, estimated at \$8.5 trillion in 1997 (Council of Economic Advisors, 2000).

economy. More information is provided in Section 4.4 of the Proposal EA.

Table 3-19. Post-Compliance Changes in Total National Economic Output (GDP)

| Option | Beef | Dairy | Hogs | Poultry | Total ^{a/} |
|-----------------|----------------------------|-------|------|---------|---------------------|
| | (millions in 1997 dollars) | | | | |
| Option 1 | | | | | |
| Baseline Total | | | | | 8,318,400 |
| Post-Regulation | 65 | 222 | 26 | 80 | 394 |
| Option 2 | | | | | |
| Baseline Total | | | | | 8,318,400 |
| Post-Regulation | 275 | 397 | 105 | 97 | 873 |

Source: USEPA's market model results, in conjunction with RIMS II multipliers (USDC, 1997b). Totals may not add due to rounding and may include double counting since each sector is modeled separately.

^{a/} Council of Economic Advisors (2002).

3.5.1.3 Regional and Community Impacts

To evaluate the potential for differential impacts among farm production regions, EPA examined employment impacts by region. EPA also evaluated whether the final requirements could result in substantial changes in volume of production, given predicted facility closures, within a particular production region. EPA concludes from these analyses that regional and community level effects are estimated to be modest, but do tend to be concentrated within the more traditional agricultural regions.

EPA does not expect that this rule will have a significant impact on where animals are raised. On one hand, on-site improvements in waste management and disposal, as required by the final rule, could accelerate recent shifts in production to more nontraditional regions as higher-cost producers in some regions exit the market to avoid the relatively high retrofitting costs associated with bringing existing facilities into compliance. On the other hand, the final regulations might favor more traditional production systems where operators grow both livestock and crops, since these operations tend to have available cropland for land application of manure nutrients. These types of operations tend to be more diverse and less specialized and, generally, smaller in size. Long-standing farm services and input supply industries in these areas could likewise benefit from the final rule, given the need to support on-site improvements in manure management and disposal. Local and regional governments, as well as other nonagricultural enterprises, would also benefit.

Table 3-20 breaks out the estimated regional employment impacts between direct (farm and processing level) and indirect/induced (other economy-wide) job losses.³⁰ As shown, EPA estimates direct employment losses to be greatest in the Midwest region given the sheer volume of animal production in the region, which includes the Dakotas, Nebraska, and Kansas as well as the Corn Belt and Lake states. In the Midwest region, EPA estimated 300 to 700 direct job losses (depending on the

³⁰ Indirect effects are a result of changes in consumer spending and thus occur in areas with higher population densities regardless of the animal sectors affected.

option). These estimated job losses include CAFO owner-operator job losses due to business closure. Total estimated job losses, including indirect and induced employment impacts, are more evenly distributed among regions and are greatest in the Mid-Atlantic, which covers areas with both high consumer populations and concentrated hog and poultry operations in North Carolina, Virginia, and the Delmarva Peninsula.

Table 3-20. Regional Distribution of Predicted National Employment Reductions

| Region ^{a/} | Agricultural Sectors Direct | Indirect/ Induced | Total | Percent of Labor Force |
|----------------------|-----------------------------|----------------------|-------|------------------------|
| | (FTEs) | | | |
| Option 1 | | | | |
| Pacific | 102 | 547 | 649 | 0.003 |
| Central | 123 | 501 | 624 | 0.003 |
| Midwest | 268 | 800 | 1,068 | 0.003 |
| South | 78 | 510 | 588 | 0.003 |
| Mid-Atlantic | 140 | 1,063 | 1,203 | 0.003 |
| Total | 712 | 3,421 | 4,133 | 0.003 |
| Option 2 | | | | |
| Pacific | 192 | 1,194 | 1,386 | 0.006 |
| Central | 347 | 1,092 | 1,439 | 0.007 |
| Midwest | 700 | 1,745 | 2,444 | 0.007 |
| South | 108 | 1,111 | 1,219 | 0.006 |
| Mid-Atlantic | 253 | 2,318 | 2,571 | 0.006 |
| Total | 1,599 | 7,460 | 9,059 | 0.007 |

Source: USEPA's market model results, in conjunction with RIMS II multipliers (USDC, 1997b). State level employment data are from the U.S. Census Bureau (1999).

Totals may not add due to rounding and may include double counting since each sector is modeled separately.

^{a/}Regions are based on the USDA Farm Production Regions (see Figure 4-1 in the Proposal EA): Pacific=Pacific, Central=Mountain and Southern Plains, Midwest=Corn Belt, Lake States, and Northern Plains, South=Delta and Southeast, Mid-Atlantic=Northeast and Appalachia.

To further evaluate regional impacts, EPA conducted the following additional assessment. The geography of impacts may be more clearly seen if the information is disaggregated further to the farm production region or state level. Table 3-21 shows the impact of the regulations at the farm production region level. The regions are ranked by the severity of agricultural impacts. The Northern Plains, Corn Belt, and Lake States dominate because of the regulation's focus on hog and cattle operations.

EPA believes that concerns about the potential regional and community effects are, in part, mitigated by changes to the final regulations, as compared to the 2001 Proposal. For the final rule,

Table 3-21. Farm Production Region Distribution of Predicted Changes in (Direct) National Employment

| Farm Production Region ^{a/} | Agricultural Sectors Direct | Indirect/ Induced | Total | Percent of Labor Force |
|--|--------------------------------|----------------------|-------|---------------------------|
| | (FTEs) | | | |
| Option 1 | | | | |
| Northern Plains | 69 | 72 | 141 | 0.005% |
| Corn Belt | 87 | 477 | 564 | 0.003% |
| Lake | 112 | 251 | 363 | 0.003% |
| Pacific | 102 | 547 | 649 | 0.003% |
| Southern Plains | 63 | 290 | 353 | 0.003% |
| Mountain | 60 | 211 | 271 | 0.003% |
| Northeast | 85 | 740 | 825 | 0.003% |
| Appalachia | 56 | 323 | 378 | 0.003% |
| Southeast | 45 | 387 | 432 | 0.003% |
| Delta | 33 | 123 | 156 | 0.003% |
| Total | 712 | 3,421 | 4,133 | 0.003% |
| Option 2 | | | | |
| Northern Plains | 257 | 157 | 414 | 0.014% |
| Corn Belt | 225 | 1,040 | 1,264 | 0.006% |
| Lake | 218 | 548 | 766 | 0.007% |
| Pacific | 192 | 1,194 | 1,386 | 0.006% |
| Southern Plains | 191 | 633 | 824 | 0.007% |
| Mountain | 156 | 459 | 615 | 0.007% |
| Northeast | 148 | 1,614 | 1,763 | 0.006% |
| Appalachia | 104 | 704 | 808 | 0.006% |
| Southeast | 63 | 844 | 906 | 0.006% |
| Delta | 45 | 268 | 313 | 0.007% |
| Total | 1,599 | 7,460 | 9,059 | 0.007% |

Source: USEPA's market model results, in conjunction with RIMS II multipliers (USDC, 1997b). State level employment data are from the U.S. Census Bureau (1999). Totals may not add due to rounding and may include double counting since each sector is modeled separately.

^{a/}USDA Farm Production Regions (see Figure 4-1 in the Proposal EA): Pacific=CA,OR,WA; Mountain=AZ,CO,ID,MT,NV,NM,UT,WY; Southern Plains= OK,TX; Northern Plains= KS,NE,ND,SD; Lake= MI,MN,WI; Corn Belt= IL,IA,IN,MO,OH; Delta= AR,LA,MS; Southeast= AL,FL,GA,SC; Appalachia= KY,NC,TN,VA,WV; Northeast= CT,DE,DC,ME,MD,MA,NH,NJ,NY,PA,RI,VT.

estimated market effects by region are considerably lower than those estimated for the proposal. For example, compared to the proposed rule where EPA estimated direct farm employment losses of more than 3,000 jobs, EPA estimates that the final rule could result in between 700 and 1,600 jobs lost. The Midwest, where EPA predicts the highest predicted job losses, is reduced from nearly 1,300 jobs lost estimated for proposal to between 300 and 700 jobs lost estimated for the final rule. Given these modest estimated effects on national and regional employment, employment effects are not expected to reach levels of concern in more finely drawn geographic regions.

3.5.1.4 Foreign Trade Impacts

Foreign trade impacts are difficult to predict because agricultural exports are determined by economic conditions in foreign markets and changes in the international exchange rate for the U.S. dollar. EPA predicts, however, that foreign trade impacts as a result of the final regulations will be minor given the relatively small projected changes in overall supply and demand for these products and the slight increase in market prices, as described Section 3.5.1.1. Measured as the percentage change in traded volumes, the increases in imports and decreases in exports estimated by EPA will each total less than 1 percent compared to baseline (pre-regulation) levels in each of the commodity sectors. Based on these results, EPA believes that any quantity and price changes resulting from the final regulations will not significantly alter the competitiveness of U.S. export markets for meat, dairy foods, and poultry.

Table 3-22 summarizes the impacts on retail level trade forecast by EPA's market model. By sector, the projected changes in imports compared to baseline trade levels range from a 0.01 percent increase in broiler imports to a 0.85 percent increase in dairy product imports. The predicted drops in U.S. exports range from a 0.01 percent reduction in broiler exports to a 0.14 percent reduction in dairy exports. Baseline information on U.S. imports and exports of livestock and poultry products is available in Section 2.5 of the Proposal EA. As shown in the table, there is little difference in the estimated results between the two regulatory options presented here (Option 1 and Option 2).

Table 3-22. Post-Compliance Retail Product Import and Export Changes

| Option | Beef | Dairy | Hogs | Broilers | Layers | Turkeys |
|---------------------|-----------|-------|------|----------|--------|---------|
| | (percent) | | | | | |
| Option 1 | | | | | | |
| Increase in Imports | 0.02 | 0.48 | 0.01 | 0.01 | 0.15 | NA |
| Decrease in Exports | 0.01 | 0.08 | 0.01 | 0.01 | 0.02 | 0.03 |
| Option 2 | | | | | | |
| Increase in Imports | 0.09 | 0.85 | 0.03 | 0.01 | 0.19 | NA |
| Decrease in Exports | 0.05 | 0.14 | 0.04 | 0.01 | 0.02 | 0.04 |

Source: USEPA, except historical data that are from Putnam and Allshouse, 1999. NA = Not applicable.

3.5.2 Market Analysis Results across Individual Subcategories

This section presents the results of EPA's market model analysis for each individual subcategory (cattle, dairy, hog, and poultry subcategories). The results presented in this section are based on the

aggregate compliance costs that EPA estimated for both CAFOs with more than 1,000 AU to comply with the effluent guideline revisions and for CAFOs with between 300 and 1,000 AU, if defined as a CAFO, to comply with the NPDES permitting requirements. Results are shown both for Option 1 and Option 2. These market effects are estimated based on estimated regulatory costs presented in Table 3-3. The tables summarizing the results discussed in this section are provided at the end of the section.

Changes in employment and earnings can affect the vitality of local communities. Community impacts are usually determined by employment changes at individual facilities. As facility-specific information and analysis were not within the scope of this study, EPA is not able to speculate on community impacts. However, EPA does disaggregate the national employment results to examine the potential regional employment impacts of the final regulations. EPA allocates estimated national level impacts by production shares across states and does not take into account existing environmental practices or other production factors (see Section 4.4 of the Proposal EA).

3.5.2.1 Beef Sector

Compared to a baseline producer price of \$66.09 per hundredweight, EPA's market model predicts that the final CAFO regulations would raise producer cattle prices by \$0.03 per hundredweight (Option 1) to \$0.13 per hundredweight (Option 2), or little more than 0.20 percent of the baseline producer price (Table 3-23). (All prices are in 1997 dollars.) At the retail level, consumer prices for beef products would rise less than half a cent per pound. At the retail commodity level, EPA's market model predicts that U.S. beef imports would rise by less than 0.1 percent, and U.S. beef exports would decrease by about 0.06 percent compared to baseline quantities.

Table 3-23 also presents EPA's estimates of both the direct (farm and processor level) and total (i.e., national level) reductions in employment for the beef sector. Overall, the decrease in national aggregate employment attributable to regulatory impacts on the beef sector range from about 700 FTE (Option 1) to about 2,800 FTE (Option 2). Projected job losses are estimated throughout the entire economy and are not attributable to the regulated community only. This analysis does not adjust for offsetting increases in other sectors of the economy that might be stimulated as a result of the final regulations. Estimated direct job losses include CAFO owner-operators, employed family members, and hired farm labor. Total farm level employment in the cattle sector was 336,700 FTEs in 1997 (Abel, Daft, and Earley, 1993, as updated by EPA; see Table 2-17 of the Proposal EA). More than 145,000 persons were employed in that sector's processing industries in 1997 (USDC, 1999a).

Table 3-23 shows that the traditional cattle production regions of the Midwest would be the most affected, followed closely by the Central region. None of the impacts represent a significant share of total employment in these regions. Compared to the baseline, EPA estimates the loss in beef agricultural employment at less than 0.02 percent of total regional employment; about half of the estimated agricultural job losses in the beef sector are expected in the Midwest region. Economy-wide employment losses are estimated at less than 0.02 percent of baseline employment.

3.5.2.2 Dairy Sector

Compared to a baseline producer price of \$13.38 per hundredweight, EPA's market model predicts that as a result of the final regulations raw milk prices would rise compared to the baseline price

by \$0.05 per hundredweight (Option 1) to \$0.08 per hundredweight (Option 2). (All prices are in 1997 dollars.) The retail dairy product price index rises by up to 0.8, less than 0.6 percent of the baseline value (Option 2). These price increases are driven by slight changes in the amount produced at the farm level and thus available for consumption (Table 3-24). At the retail commodity level, EPA's market model predicts that U.S. dairy product imports would rise up to 0.9 percent, and U.S. dairy product exports would decrease by about 0.14 percent compared to baseline quantities (Option 2).

Table 3-24 also presents EPA's estimates of both the direct (farm and processor level) and total (national level) changes in employment for the dairy sector. EPA estimates total employment losses attributable to the impact of the regulations on the dairy sector range from about 2,400 FTE (Option 1) to about 4,400 FTE (Option 2). Projected job losses are estimated throughout the entire economy and are not attributable to the regulated community only. This analysis does not adjust for offsetting increases in other sectors of the economy that might be stimulated as a result of the final regulations. Estimated direct job losses include CAFO owner-operators, employed family members, and hired farm labor. Total farm level employment in the dairy sector was 483,800 FTEs in 1997 (Abel, Daft, and Earley, 1993, as updated by EPA). There were more than 141,000 FTE jobs in dairy processing in 1997 (USDC, 1999a).

Table 3-24 shows that the results of EPA's analysis indicate that dairy operations in the Midwest region would be most affected, followed by operations in the Mid-Atlantic and Pacific regions. The loss in dairy agricultural employment is estimated at less than 0.01 percent of total regional employment; about 35 percent of the estimated agricultural job losses in the dairy sector are expected in the Midwest region. Economy-wide employment losses are estimated at less than 0.02 percent of baseline employment for the sector.

3.5.2.3 Hog Sector

Compared to a baseline producer price of \$54.30 per hundredweight (hundredweight), EPA's market model predicts that the final CAFO regulations would raise producer prices by \$0.02 per hundredweight (Option 1) to \$0.10 per hundredweight (Option 2), or less than 0.2 percent of baseline producer price (Table 3-25). At the retail level, consumer prices for pork products would rise about one-tenth of one cent per pound. These price increases are driven by slight changes in the amount of pork products produced at the farm level and thus available for consumption. At the commodity level, EPA's market model predicts that U.S. pork imports would rise by about 0.03 percent and U.S. pork exports would decrease by about 0.04 percent compared to baseline quantities.

Table 3-25 also presents EPA's estimates of both the direct (i.e., farm and processor level) and total (i.e., national level) reductions in employment for the hog sector. Overall, EPA decreases in national aggregate employment in the hog sector by 300 FTE (Option 1) to about 1,000 FTE (Option 2). Projected job losses are estimated throughout the entire economy and are not attributable to the regulated community only. This analysis does not adjust for offsetting increases in other sectors of the economy that might be stimulated as a result of the final regulations. Estimated direct job losses include CAFO owner-operators, employed family members, and hired farm labor. Total farm level employment of 195,900 FTEs in the hog sector nationwide in 1997 (Abel, Daft, and Earley, 1993, as updated by EPA). Employment in the hog processing sector accounted for over 84,000 FTE jobs in 1997 (USDC, 1999a).

Table 3-25 shows that the traditional hog growing regions of the Midwest would be the most affected, followed by the Mid-Atlantic. None of the impacts represent a significant share of total employment in these regions. Compared to the baseline, EPA estimates the loss in hog agricultural

employment at under 0.01 percent; almost 70 percent of the estimated agricultural job losses in the hog sector are expected in the more traditional Midwest region. Economy-wide employment losses are estimated at under 0.01 percent compared to the baseline.

3.5.2.4 Poultry Sector

A summary of the key results of the market model for the broiler, layer, and turkey sectors is shown in Tables 3-26, 3-27, and 3-28. These tables indicate the predicted changes in farm and retail prices, quantities, national and regional employment, and national economic output.

Compared to a baseline producer price of 37 cents per pound (in 1997 dollars), EPA's market model predicts that the final CAFO regulations would raise broiler producer prices by about 0.05 cents per pound, or about 0.10 percent of the baseline producer price (Table 3-26). At the retail level, consumer prices for broiler products would also rise by about 0.05 cents per pound. Egg prices are projected to increase by under 0.2 cent per dozen under the final regulations, or less than 0.4 percent of the baseline producer price of 69.8 cents per dozen (Table 3-27). Consumer prices for eggs are also projected to rise by about 0.3 cents per dozen. For turkey, EPA's market model predicts that the final CAFO regulations would raise producer prices by under 0.1 cent per pound, less than 0.2 percent of the 40.1 cents per pound baseline producer price (Table 3-28). At the retail level, consumer prices for turkey products would also rise by about 0.2 cent per pound. In most cases, there is little differences between the estimated results for both Option 1 and Option 2.

These price increases are driven by slight changes in the amount of poultry products produced at the farm level and thus available for consumption. At the commodity level, EPA's market model predicts that U.S. egg imports would increase by about 0.20 percent and broiler imports would increase by 0.01 percent compared to baseline imports, but turkey imports would not change. U.S. broiler, turkey, and egg exports would all decrease by less than 0.04 percent relative to baseline exports.

Tables 3-26 through 3-28 also present EPA's estimates of both the direct (farm and processor level) and total (national level) reductions in employment for the poultry sector. Overall, national aggregate employment reductions attributable to the impact of the regulations on the broiler sector are estimated at 400 jobs to 500 jobs lost. National aggregate employment losses in the egg-laying sector would be 300 jobs to 400 jobs lost. In the turkey sector, the analysis shows that about 200 jobs would be lost. Projected job losses are estimated throughout the entire economy and are not attributable to the regulated community only. This analysis does not adjust for offsetting increases in other sectors of the economy that might be stimulated as a result of the final regulations. Estimated direct job losses include CAFO owner-operators, employed family members, and hired farm labor. Total farm level employment in the poultry sector was 71,800 FTEs nationwide 1997 (Abel, Daft, and Earley, 1993, as updated by EPA). More than 204,000 persons were employed in poultry processing in 1997 (USDC, 1999a).

Table 3-26 shows that the dominant broiler producing regions of the South would be the most affected, followed by the Mid-Atlantic. The largest impacts on turkey and egg production would be in the Midwest. None of the impacts represent a significant share of total employment in these regions. Compared to the baseline, EPA estimates the loss in broiler agricultural employment would be less than 0.04 percent; almost 60 percent of the estimated agricultural job losses in the broiler sector are expected in the South (Table 3-26). About 40 percent of egg and turkey industry job losses are expected in the Midwest (Tables 3-27 and 3-28). Again, economy-wide employment losses are estimated at under 0.01 percent compared to baseline employment.

Table 3-23. Summary of Market Model Results for the Beef Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|------------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | \$66.09/cwt | \$66.12/cwt | \$66.22/cwt |
| Quantity ^{a/} Produced | 47,967 mil. lbs. | 47,958 mil. lbs. | 47,927 mil. lbs. |
| Quantity Exported | 331 mil. lbs. | 331 mil. lbs. | 330 mil. lbs. |
| Quantity Imported | 2,400 mil. lbs. | 2,401 mil. lbs. | 2,405 mil. lbs. |
| Retail Products | | | |
| Price | \$2.80/lb. | \$2.801/lb. | \$2.803/lb. |
| Quantity Demanded | 26,031 mil. lbs. | 26,028 mil. lbs. | 26,016 mil. lbs. |
| Quantity Exported | 2,136 mil. lbs. | 2,136 mil. lbs. | 2,135 mil. lbs. |
| Quantity Imported | 2,343 mil. lbs. | 2,344 mil. lbs. | 2,345 mil. lbs. |
| Employment Reduction ^{b/} | | | |
| Direct Farm | 336,700 FTEs | 113 FTEs | 487 FTEs |
| Direct Processor | 145,617 FTEs | 15 FTEs | 67 FTEs |
| Total Economy | 129.6 mil. FTEs | 657 FTEs | 2,827 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$65 million | \$282 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 23,869 FTEs | 6 FTEs | 27 FTEs |
| Central | 195,434 FTEs | 52 FTEs | 225 FTEs |
| Midwest | 254,929 FTEs | 68 FTEs | 293 FTEs |
| South | 1,430 FTEs | 0 FTEs | 2 FTEs |
| Mid-Atlantic | 6,656 FTEs | 2 FTEs | 8 FTEs |
| Total | 482,317 FTEs | 129 FTEs | 554 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} Includes veal and heifer.

^{b/} 1 FTE = 2,080 hours of labor.

Table 3-24. Summary of Market Model Results for the Dairy Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|-------------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | \$13.38/cwt | \$13.43/cwt | \$13.46/cwt |
| Quantity Produced | 156,100 mil. lbs. | 155,955 mil. lbs. | 155,835 mil. lbs. |
| Retail Products | | | |
| Price | 145.50 Index | 145.95 Index | 146.33 Index |
| Quantity Demanded | 155,239 mil. lbs. | 155,119 mil. lbs. | 155,020 mil. lbs. |
| Quantity Exported | 5,244 mil. lbs. | 5,240 mil. lbs. | 5,237 mil. lbs. |
| Quantity Imported | 4,383 mil. lbs. | 4,404 mil. lbs. | 4,421 mil. lbs. |
| Employment Reduction ^{a/} | | | |
| Direct Farm | 483,800 FTEs | 370 FTEs | 675 FTEs |
| Direct Processor | 141,400 FTEs | 15 FTEs | 26 FTEs |
| Total Economy | 129.6 mil. FTEs | 2,404 FTEs | 4,387 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$222 million | \$406 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 138,725 FTEs | 85 FTEs | 156 FTEs |
| Central | 91,963 FTEs | 57 FTEs | 103 FTEs |
| Midwest | 225,389 FTEs | 139 FTEs | 253 FTEs |
| South | 27,405 FTEs | 17 FTEs | 31 FTEs |
| Mid-Atlantic | 141,718 FTEs | 87 FTEs | 159 FTEs |
| Total | 625,200 FTEs | 384 FTEs | 701 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} 1 FTE = 2,080 hours of labor.

Table 3-25. Summary of Market Model Results for the Hog Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|-------------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | \$54.30/cwt | \$54.32/cwt | \$54.40/cwt |
| Quantity Produced | 23,542 mil. lbs. | 23,539 mil. lbs. | 23,530 mil. lbs. |
| Quantity Exported | 14 mil. lbs. | 14.1 mil. lbs. | 14.1 mil. lbs. |
| Quantity Imported | 814 mil. lbs. | 813.8 mil. lbs. | 814.5 mil. lbs. |
| Retail Products | | | |
| Price | \$2.45/lb. | \$2.45/lb. | \$2.45/lb. |
| Quantity Demanded | 16,863 mil. lbs. | 16,862 mil. lbs. | 16,857 mil. lbs. |
| Quantity Exported | 1,044 mil. lbs. | 1,043.5 mil. lbs. | 1,043.2 mil. lbs. |
| Quantity Imported | 633 mil. lbs. | 633.1 mil. lbs. | 633.2 mil. lbs. |
| Employment Reduction | | | |
| Direct Farm | 195,900 FTEs ^{a/} | 37 FTEs | 153 FTEs |
| Direct Processor | 84,723 FTEs | 10 FTEs | 40 FTEs |
| Total Economy | 129.6 mil. FTEs | 254 FTEs | 1,047 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$26 million | \$108 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 1,507 FTEs | 0 FTEs | 1 FTEs |
| Central | 20,128 FTEs | 3 FTEs | 14FTEs |
| Midwest | 189,391 FTEs | 32 FTEs | 131 FTEs |
| South | 12,129 FTEs | 2 FTEs | 8 FTEs |
| Mid-Atlantic | 57,468FTEs | 10 FTEs | 40 FTEs |
| Total | 280,623 FTEs | 47 FTEs | 194 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} 1 FTE = 2,080 hours of labor.

Table 3-26. Summary of Market Model Results for the Broiler Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|-------------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | 37.00¢/lb. | 37.04¢/lb. | 37.05¢/lb. |
| Quantity Produced | 27,551 mil. lbs. | 27,548 mil. lbs. | 27,548 mil. lbs. |
| Retail Products | | | |
| Price | 151.00¢/lb. | 151.04¢/lb. | 151.05¢/lb. |
| Quantity Demanded | 22,508 mil. lbs. | 22,506 mil. lbs. | 22,505 mil. lbs. |
| Quantity Exported | 5,048 mil. lbs. | 5,047.5 mil. lbs. | 5,047.4 mil. lbs. |
| Quantity Imported | 5 mil. lbs. | 5 mil. lbs. | 5 mil. lbs. |
| Employment Reduction ^{a/ b/} | | | |
| Direct Farm | 71,800 FTEs | 73 FTEs | 88 FTEs |
| Direct Processor | 204,200 FTEs | 13 FTEs | 15 FTEs |
| Total Economy | 129.6 mil. FTEs | 401 FTEs | 487 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$40 million | \$48 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 11,764 FTEs | 4 FTEs | 4 FTEs |
| Central | 22,826 FTEs | 7 FTEs | 9 FTEs |
| Midwest | 13,077 FTEs | 4 FTEs | 5 FTEs |
| South | 156,986 FTEs | 48 FTEs | 59 FTEs |
| Mid-Atlantic | 71,347 FTEs | 22 FTEs | 27 FTEs |
| Total | 276,000 FTEs | 85 FTEs | 103 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} 1 FTE = 2,080 hours of labor.

^{b/} Estimated employment across all poultry sectors (Table 2-17 of the Proposal EA).

Table 3-27. Summary of Market Model Results for the Egg-Laying Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|-----------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | 69.80¢/doz. | 69.97¢/doz. | 70.07¢/doz. |
| Quantity Produced | 6,473 mil. doz. | 6,472 mil. doz. | 6,471 mil. doz. |
| Retail Products | | | |
| Price | 106.00¢/doz | 106.17¢/doz. | 106.27¢/doz. |
| Quantity Demanded | 5,357 mil. doz. | 5,356 mil. doz. | 5,356 mil. doz. |
| Quantity Exported | 227.8 mil. doz. | 227.8 mil. doz. | 227.7 mil. doz. |
| Quantity Imported | 7 mil. doz. | 7 mil. doz. | 7 mil. doz. |
| Employment Reduction ^{a/ b/} | | | |
| Direct Farm | 71,800 FTEs | 17 FTEs | 27 FTEs |
| Direct Processor | 204,200 FTEs | 5 FTEs | 7 FTEs |
| Total Economy | 129.6 mil. FTEs | 259 FTEs | 408 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$24 million | \$38 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 11,764 FTEs | 3 FTEs | 4 FTEs |
| Central | 22,826 FTEs | 2 FTEs | 3 FTEs |
| Midwest | 13,077 FTEs | 8 FTEs | 13 FTEs |
| South | 156,986 FTEs | 5 FTEs | 7 FTEs |
| Mid-Atlantic | 71,347 FTEs | 4 FTEs | 7 FTEs |
| Total | 276,000 FTEs | 22 FTEs | 34 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} 1 FTE = 2,080 hours of labor.

^{b/} Estimated employment across all poultry sectors (Table 2-17 of the Proposal EA).

Table 3-28. Summary of Market Model Results for the Turkey Sector

| Variable | Pre-Regulatory Value/Units | Post-Regulatory Value/Units | |
|---|----------------------------|-----------------------------|-------------------|
| | | Option 1 | Option 2 |
| Farm Products | | | |
| Price | 40.10¢/lb. | 40.15¢/lb. | 40.17¢/lb. |
| Quantity Produced | 5,412 mil. lbs. | 5,410.6 mil. lbs. | 5,410.0 mil. lbs. |
| Retail Products | | | |
| Price | 105.10¢/lb | 105.15¢/lb. | 105.17¢/lb. |
| Quantity Demanded | 4,814 mil. lbs. | 4,813 mil. lbs. | 4,812 mil. lbs. |
| Quantity Exported | 598 mil. lbs. | 597.8 mil. lbs. | 597.8 mil. lbs. |
| Employment Reduction ^{a/ b/} | | | |
| Direct Farm | 71,800 FTEs | 41 FTEs | 59 FTEs |
| Direct Processor | 204,200 FTEs | 3 FTEs | 5 FTEs |
| Total Economy | 129.6 mil. FTEs | 157 FTEs | 227 FTEs |
| Output Reduction | | | |
| National | \$8,478,600 million | \$16 million | \$23 million |
| Regional Farm and Processing Employment Reduction | | | |
| Pacific | 11,764 FTEs | 4 FTEs | 5 FTEs |
| Central | 22,826 FTEs | 2 FTEs | 3 FTEs |
| Midwest | 13,077 FTEs | 17 FTEs | 25 FTEs |
| South | 156,986 FTEs | 6 FTEs | 9 FTEs |
| Mid-Atlantic | 71,347 FTEs | 15 FTEs | 22 FTEs |
| Total | 276,000 FTEs | 45 FTEs | 65 FTEs |

Source: Post-regulatory changes are estimated by USEPA. Pre-regulatory prices, quantities, and trade volumes, see Table 4-16 (Section 4 of the Proposal EA). Pre-regulatory employment, see Table 2-17 (Section 2 of the Proposal EA) allocated to regions based on production as are the post-regulatory values.

^{a/} 1 FTE = 2,080 hours of labor.

^{b/} Estimated employment across all poultry sectors (Table 2-17 of the Proposal EA).

SECTION FOUR

FINAL REGULATORY FLEXIBILITY ANALYSIS

This section considers the effects of the CAFO regulations on small businesses in the livestock and poultry industries. Section 4.1 discusses EPA's requirements under the Regulatory Flexibility Act. Section 4.2 outlines EPA's initial assessment of small businesses in the sectors affected by the regulations. Section 4.3 presents EPA's final regulatory flexibility analysis and summarizes other steps taken by the Agency to comply with the RFA. Section 4.4 presents the data, methodology, and results of EPA's analysis of impacts on small businesses for this rulemaking.

4.1 THE REGULATORY FLEXIBILITY ACT AS AMENDED BY THE SMALL BUSINESS REGULATORY ENFORCEMENT FAIRNESS ACT

The Regulatory Flexibility Act (RFA, 5 U.S.C *et seq.*, Public Law 96-354), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) generally requires an agency to prepare a regulatory flexibility analysis describing the impact of the regulatory action on small entities as part of the rulemaking. This analysis is required for any rule subject to notice-and-comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a "significant impact on a substantial number of small entities." Small entities include small businesses, small organizations, and governmental jurisdictions. Because the CAFO regulations could have a significant economic impact on a substantial number of small entities, EPA has prepared this final regulatory flexibility analysis (FRFA).

In addition to the preparation of an analysis, the RFA, as amended by SBREFA, imposes certain responsibilities on EPA when the Agency proposes rules that might have a significant impact on a substantial number of small entities. These include requirements to consult with representatives of small entities about the proposed rule. The statute requires that, where EPA has prepared an initial regulatory flexibility analysis (IRFA), the Agency must convene a Small Business Advocacy Review (SBAR) Panel for the proposed rule to seek the advice and recommendations of small entities concerning the rule. The panel is composed of employees from EPA, the Office of Information and Regulatory Affairs within the Office of Management and Budget, and the Office of Advocacy of the Small Business Administration (SBA).

4.2 INITIAL ASSESSMENT

Prior to the 2001 Proposal, EPA conducted an initial assessment according to Agency guidance on implementing RFA requirements (USEPA, 1999i). First, EPA must indicate whether the proposal is a rule subject to notice-and-comment rulemaking requirements. EPA determined that the proposed CAFO regulations were subject to notice-and-comment rulemaking requirements. Second, EPA should develop a profile of the affected small entities. EPA has developed such a profile of the livestock and poultry sectors, which includes all affected operations as well as small businesses. This information is provided in Section 2 and other sections of the Proposal EA (USEPA, 2001a). Third, EPA's assessment needs to

determine whether the rule would affect small entities and whether the rule would have an adverse economic impact on small entities.

For the proposed rulemaking, EPA could not conclude that costs are sufficiently low to justify “certification” that the regulations would not impose a significant economic impact on a substantial number of entities. Instead, EPA complied with all RFA provisions and conducted outreach to small businesses, convened an SBAR Panel, and prepared an IRFA. That analysis described EPA’s assessment of the impacts of the proposed CAFO regulations on small businesses in the livestock and poultry sectors. A summary of this analysis was published in the *Federal Register* at the time of publication of the 2001 Proposal (66 FR 3099-3103, see: USGPO, 2001a). More detailed information on EPA’s IRFA is provided in Section 9 of the Proposal EA. EPA’s Proposal EA also describes other requirements of EPA’s initial assessment of small businesses and summarizes the steps taken by EPA to comply with the RFA.

Since proposal, EPA has received new information and data related to small business in the livestock and poultry industries, including revisions to the SBA’s definition of “small business” in these sectors and updates to EPA’s estimate of the number of affected operations to reflect USDA estimates. This information was presented in the 2001 Notice (66 FR 58556; USGPO, 2001b). Section 4.2.1 of this report reviews SBA’s revised definitions of small entities in the livestock and poultry industry and discusses a rationale for using an alternative definition of small business in one sector. Section 4.2.2 then uses the definitions of small entities laid out in Section 4.2.1 to estimate the number of operations that meet this small business definition. Section 4.2.3 presents the results of the initial assessment EPA conducted for the 2001 Proposal, which provides a first level screen of potential impacts on small business CAFOs and serves as a signal for additional analysis.

4.2.1 Definition of Small CAFO Businesses

The RFA defines a “small entity” as a small not-for-profit organization, small governmental jurisdiction, or small business. No small governmental operations operate CAFOs. A few not-for-profit organizations might operate CAFOs, but complete information is not available to warrant including not-for-profit organizations in this analysis. The analysis therefore focuses only on small businesses that are defined or designated as CAFOs. (Section 1 of this report describes the circumstances under which an AFO is defined or designated as a CAFO and is subject to the final regulations.)

The RFA requires, with some exceptions, that EPA define small businesses according to SBA’s size standards. SBA sets size standards for defining small businesses by number of employees or amount of revenues for specific industries. These size standards vary by North American Industry Classification System (NAICS) code. CAFOs are listed under NAICS 112, Animal Production.³¹

Table 4-1 shows SBA size standards by SIC code for each of the six livestock and poultry sectors, which are expressed in terms of average “annual receipts” (revenue). With one exception,

³¹ In September 2000, SBA updated the basis for its size standard from Standard Industrial Classification (SIC) codes to NAICS codes (USGPO, 2000; U.S. Census Bureau, 2000). By SIC code, these industries are listed under SIC 02, Livestock and Animal Specialties. The actual size standards for each sector, specified as an annual revenue threshold, did not change as a result of this update.

current SBA standards define a “small business” within each of the main livestock and poultry sectors as an operation that generates average revenues ranging from less than \$0.75 million per year (hog, dairy, broiler, and turkey sectors) to less than \$1.5 million per year (beef feedlot sector), averaged over the three most recent fiscal years (USGPO, 2000; SBA, 1998). The exception is the revenue threshold for a small chicken egg operation, which SBA has defined as a business that generates up to \$9 million annually. For reasons outlined in Section 9.2.1 of the Proposal EA, EPA believes that SBA’s definition of small business for the egg laying sector (revenues of \$9 million per year) does not truly characterize a small business in this sector. As discussed extensively in documentation supporting the 2001 Proposal, EPA is using an alternative definition of \$1.5 million annually for this analysis. Refer to the Proposal EA (USEPA, 2001a) and docket materials cited in that document, and the proposal itself (USGPO, 2001a).

SBA’s size standards differ from the revenue cutoff generally recognized by USDA, which has set \$250,000 in gross sales as its cutoff between small and large family farms (USDA, 1998).

As discussed in the 2001 Notice (66 FR 58570-58571; see USGPO, 2001b), recent revisions to SBA’s small business definitions for some sectors necessitate changes to EPA’s estimate of the number of AFOs that are potentially defined as CAFOs and subject to the final requirements. Prior to June 2001, SBA defined a “small business” for the dairy, hog, broiler, and turkey sectors as an operation with annual sales of less than \$0.5 million per year. On June 7, 2001, SBA raised the size standards for these four sectors to \$0.75 million per year. SBA’s notice of this change is at 66 FR 30646 (USGPO, 2001c). Although SBA did not revise its small business definition for the beef feedlot and egg laying sectors, updates to USDA estimates of the number of AFOs that are potentially defined as CAFOs also require changes to EPA’s overall estimates of the number of small businesses affected by the rulemaking. EPA’s revised estimates of the number of affected small businesses are presented in Section 4.2.2.

Table 4-1. SBA Revenue Size Standards for Small Livestock and Poultry Operations

| NAICS Code (SIC Code) | NAICS Industry Description | SBA Size Standard ^{a/} | EPA-Assumed Revenue Cutoff |
|----------------------------------|---------------------------------------|--|---------------------------------------|
| 112112 (0211) | Beef Cattle Feedlots | \$1.5 million | same as SBA |
| 112111 (0241/0212) | Beef Cattle Ranching and Farming | \$0.75 million | same as SBA |
| 11221 (0213) | Hog and pig farming | \$0.75 million | same as SBA |
| 11212 (0241) | Dairy cattle and milk production | \$0.75 million | same as SBA |
| 11232 (0251) | Broilers and other meat-type chickens | \$0.75 million | same as SBA |
| 11231 (0252) | Chicken egg production | \$9.0 million | \$1.5 million |
| 11233 0253 | Turkey production | \$0.75 million | same as SBA |

Source: SBA, 1998; USGPO, 1991a, 1991b, 1996, 2000, 2001c; U.S. Census Bureau, 2000.

^{a/}SBA Size Standards by NAICS code (13 CFR Part 121) correspond to classifications under SIC classification.

4.2.2 Number of Affected Small Businesses

EPA uses three steps to determine the number of small businesses that might be affected by the CAFO regulations. First, EPA identifies small businesses in the relevant livestock and poultry sectors by equating SBA's annual revenue definition with the number of animals at an operation. Second, EPA estimates the total number of small businesses in these sectors using farm size distribution data from USDA. Third, based on the regulatory thresholds being promulgated, EPA estimates the number of small businesses that would be subject to the final requirements. These steps are summarized below. More detailed information on this approach is presented in Section 9.2.2 of the Proposal EA.

In the absence of entity level revenue data, EPA identifies small businesses in the livestock and poultry sectors by equating SBA's annual revenue definitions of "small business" to the number of animals at these operations (step 1). This step produces a threshold based on the number of animals that EPA uses to define small livestock and poultry operations and reflects the average farm inventory (number of animals) that would be expected at an operation with annual revenues that define a small business. This initial conversion is necessary because USDA data by farm size are not available by business revenue. With the exception of egg laying operations, EPA uses SBA's small business definition to equate the revenue threshold with the number of animals raised onsite at an equivalent small business in each sector (shown in Table 4-1). For egg laying operations, EPA uses an alternative revenue definition of small business, discussed in Section 4.2.1.

EPA estimates the number of animals at an operation to match SBA's small business definitions based on annual revenue size standard (expressed as annual revenue per entity) and USDA-reported farm revenue data that are scaled on a per-animal basis (expressed as annual revenue per inventory animal for an average facility). Financial data used for this calculation are from USDA's 1997 ARMS database (USDA/ERS, 1999a). USDA's data report average national revenue for each sector, combining both livestock and nonlivestock farm revenue (income from crop sales and other farm-related income, including government payments). EPA uses the derived per-animal revenues shown in Table 4-2 to equate SBA's size standard (in revenues) with farm size based on the number of animals, as follows:

$$\frac{\text{Average Number of Animals}}{\text{Farm}} = \frac{\text{SBA's small business definition (\$ per year per farm)}}{\text{average total revenue per head (\$/animal)}}$$

The resultant number of animals represents the average animal inventory threshold for a small business. Estimated "small business" thresholds for each sector are shown in Table 4-2. Additional information on this approach and the data used for this calculation are outlined in Section 4.2.2 of the Proposal EA. The resultant size threshold represents an average animal inventory for a small business.

For the purpose of conducting its FRFA for this rulemaking, EPA is defining "small business" for these sectors as an operation that houses or confines less than the following: 1,400 fed beef cattle (includes fed beef, veal, and heifers); 300 mature dairy cattle; 2,100 market hogs; 37,500 turkeys; 61,000 layers; or 375,000 broilers (Table 4-2). As shown in Table 4-2, with the exception of dairy and some poultry operations, SBA's small business definition for these sectors more or less corresponds to operations with fewer than 1,000 AU being considered small businesses.

EPA then estimates the total number of small businesses in these sectors using facility size distribution data from USDA (step 2). Using the threshold sizes identified for small businesses in the

livestock and poultry sectors (Table 4-2), EPA matches these thresholds with the number of operations associated with the size thresholds, based on available USDA data, to estimate the total number of small animal confinement operations in these sectors. EPA's estimates of the number of potential CAFOs, derived from these USDA data (Kellogg, 2002), are presented in Section 3.1 of this report. This constitutes the primary data source that EPA uses to match the small business thresholds corresponding to SBA's definitions.

Because the USDA data are organized by broad AU groupings—operations with more than 1,000 AU, 750 AU, 500 AU and 300 AU—EPA has matched the animal thresholds above to the closest available AU grouping as follows. For hogs, EPA assumes that data reported for the 1,000 AU threshold (about 2,500 hogs) provide a close approximation of the 2,100 hog threshold to determine the number of small businesses in this sector. For dairies, EPA assumes that the 500 AU threshold (about 350 dairy cows) approximates the 300 dairy cow threshold. For turkey and egg laying operations with dry manure systems, EPA assumes that the 750 AU threshold (about 61,500 layers and 38,500 turkeys) approximates the 61,000 layers and 37,500 turkeys threshold. Because egg-laying operations with wet manure systems are regulated based on a different AU threshold (1,000 AU is equivalent to 30,000 birds), EPA assumes that all estimated operations for this category are small businesses. The resultant estimates of the number of small businesses in these sectors derived under these assumptions, in conjunction with available USDA data (Kellogg, 2002), are presented in Table 4-2.

For both cattle and broilers, EPA also relies on data on operations with more than 1,000 AU (corresponding to operations with 1,000 beef, veal, and heifers, and about 125,000 broilers), but uses these data as a starting point to assess the total number of small businesses in these sectors. To further determine the number of small businesses with more than 1,000 AU (corresponding to operations with less than 1,400 cattle and 375,000 broilers, as shown in Table 4-1), EPA assumes that, for cattle, about 40 percent of operations with more than 1,000 AU are potentially small businesses. This assumption is based on available USDA data on the share of feedlots with between 1,000 and 2,000 head, calculated as a share of all operations with more than 1,000 AU (Krause, 1991). For broilers, EPA assumes that nearly all operations are small businesses, with the exception of the largest 330 operations, which EPA assumes have more than 375,000 birds. This assumption is consistent with that assumed for the 2001 Proposal and is consistent with USDA broiler sales data and information (USDA/NASS, 2000a). The resultant estimates of the number of small businesses in these sectors using this approach, in conjunction with USDA data (Kellogg, 2002) are presented in Table 4-2.

USDA estimates that there were approximately 238,000 animal confinement facilities in 1997 (see Section 3). Table 4-2 presents EPA's estimates of the total number of small livestock and poultry operations that are potentially small businesses. Using the approach outlined in this section, EPA estimates that about 227,000 operations (95 percent of all operations) are small businesses. However, not all of these operations would be affected by the CAFO regulations.

EPA recognizes that this approach might not accurately portray actual small businesses in all cases across all sectors. On the one hand, the resulting small business estimate would suggest that a 15- to 20-house broiler operation with 375,000 birds would be a small business. Information from industry sources, however, suggests that a two-house broiler operation with roughly 50,000 birds is small (Madison, 1999; USEPA, 2000d). Therefore, it is likely that some medium- and large-size broiler operations are being considered small businesses (USEPA, 2000e).

On the other hand, it is possible that the resulting small business estimate might have failed to identify some small businesses in the other sectors as "small." For example, EPA's approach identifies

as a “small business” hog operations with fewer than 2,500 pigs and turkey operations with fewer than 41,250 turkeys, which account for less than 93 percent and 80 percent of all operations, respectively, and less than 40 percent of sales in these sectors (Kellogg, 2002). These proportions are below SBA’s presumed coverage rates, which define as small about 99 percent of all operations and account for approximately 62 percent of sales (Perez, 2000). Therefore, it is likely that there are additional small hog and turkey businesses that are not captured under the revised methodology (USEPA, 2000e).

Table 4-2. Number of Small CAFOs That Might Be Affected by the CAFO Regulations

| Sector | Total Annual (\$million) Revenue ^{a/} (x) | Revenue per Head ^{b/} (Avg. U.S.) (y) | Number of Animals at Small CAFO Businesses (z = x/y) | Estimated Number of AFOs | Total “Small” AFOs | Small Business CAFOs |
|-----------------------------|---|---|---|---------------------------------|------------------------------|-----------------------------|
| Cattle ^{d/} | \$1.5 | \$1,060 | 1,400 | 21,800 | 20,430 | 1,200 |
| Dairy | \$0.75 | \$2,573 | 300 | 94,800 | 91,360 | 1,294 |
| Hogs | \$0.75 | \$363 | 2,100 | 51,800 | 47,850 | 1,485 |
| Broilers | \$0.75 | \$2 | 375,000 | 17,800 | 17,450 | 1,822 |
| Egg Layers | \$9.0 | \$25 | 365,000 | ND | ND | ND |
| | \$1.5 | | 61,000 | 6,400 | 5,460 | 486 |
| Turkeys | \$0.75 | \$20 | 37,500 | 3,300 | 2,660 | 27 |
| All AFOs | NA | NA | NA | 237,800 ^{e/} | 227,120 ^{e/} | 6,314 |

NA=Not Applicable. ND = Not Determined. “AFOs” have confined animals on-site.

^{a/} SBA size standards are at 13 CFR Part 121. EPA assumes an alternative definition of \$1.5 million in annual revenues for egg laying operations.

^{b/} Average revenue per head across all operations for each sector derived from data obtained from USDA’s 1997 ARMS data (USDA/ERS, 1999a). For more information, see Section 4 of EPA’s Proposal EA (USEPA, 2001a).

^{c/} Total small business CAFOs do not include estimates of designated CAFOs.

^{d/} Includes fed cattle, veal and heifers.

^{e/} USDA total include estimates of the number of operations with “cattle other than fattened cattle or milk cows” and also adjusts for double counting, accounting for roughly 42,000 operations (Kellogg, 2002). See Section 3. EPA’s total for broilers and egg layers also differs because of differing 1,000 AU definitions (see Section 3).

The final step (step 3) in EPA’s approach is to estimate the number of small businesses subject to the CAFO regulations based on the regulatory thresholds being promulgated, as discussed in Section 3 of this report. Not all small confinement operations would be subject to the CAFO regulations. The final regulations apply only to those operations that meet the regulatory definition of a CAFO or those that have been designated as CAFOs by the NPDES permitting authority because of risks posed to water quality and public health, as discussed in Section 1. The regulations *define* as a CAFO those operations that confine more than 1,000 AU, as well as a subset of operations with between 300 and 1,000 AU. The final regulations may also apply to an operation that is *designated* as a CAFO by the NPDES permitting authority on a case-by-case basis, based on an on-site inspection. As described in this section, EPA’s estimates of the number of operations is based on USDA information for 1997 (Kellogg, 2002), which

constitutes the primary data source that EPA uses to determine the number of potential small businesses that might be subject to the regulations.

Table 4-3 presents the estimated number of livestock and poultry operations that might be subject to the CAFO regulations and are also small businesses (“small business CAFOs”) by facility size category. EPA estimates that of the approximately 238,000 animal confinement facilities in 1997 roughly 95 percent are small businesses. Not all of these operations would be affected by the final rule. Table 4-3 shows EPA’s estimates of the number of small business CAFOs that are expected to be affected by this rule. For this analysis, EPA estimates that about 6,200 affected CAFOs across all size categories are small businesses, accounting for more than 40 percent of the estimated 14,515 affected facilities. EPA estimates that among CAFOs with more than 1,000 AU about 2,330 operations are small businesses (accounting for about one-fourth of all CAFOs in this size category). Most affected small businesses are in the broiler sector. Among CAFOs with between 300 and 1,000 AU, EPA estimates about 3,830 operations are small businesses, with most of the affected small businesses are in the hog, dairy, and broiler sectors.

These estimates are based on USDA data for 1997. Because of continued consolidation and facility closure since 1997, EPA’s estimates might overstate the actual number of small businesses in these sectors. Ongoing trends are causing some existing small and medium operations to expand their inventories to achieve economies of scale. Some of the CAFOs considered here as small businesses might no longer be counted as small businesses because they now have higher revenues. Furthermore, some CAFOs might now be owned by a larger, vertically integrated firm and might no longer be small businesses. EPA expects that there are few such operations, but it does not have data or information to reliably estimate the number of CAFOs that meet this description. In addition, for reasons noted in the record, EPA believes that the number of small broiler operations is overestimated and might actually include a number of medium and large broiler operations that should not be considered small businesses.

Table 4-3 also shows the expected number of small businesses that may be designated as CAFOs and subject to the rule. EPA estimates that about 172 operations will be designated as CAFOs. This estimate is expressed over the 5-year permit period (that is, assumes that roughly 35 operations will be designated annually). Among these, an estimated 160 operations are in the 300 to 1,000 AU size category; about 12 operations have fewer than 300 AU. (See Table 3-1.) EPA assumes that all of these operations are small businesses.³² For analysis purposes, EPA also assumes that these operations are located in more traditional production regions and are characterized by operations with available land for land application of manure but also high technology needs (see discussion in Section 4.4).

³²EPA expects that USDA will continue to provide voluntary assistance to those additional operations that are now defined as CAFOs under the current permitting requirements and are not covered by the final regulations.

Table 4-3. Total Number of Small Business CAFOs Subject to Regulation

| Sector | All AFOs | Total Small Business AFOs | Small Business CAFOs >1,000 AU (Defined) | Small Business CAFOs 300-1000 AU (Defined) | Small Business CAFOs (Designated) |
|-------------------|------------------------------|------------------------------|--|--|-----------------------------------|
| | (Number of operations) | | | | |
| Fed Cattle | 17,800 | 16,570 | 538 | 174 | 15 |
| Veal | 3,840 | 160 | 5 | 7 | 0 |
| Heifers | 170 | 3,700 | 97 | 230 | 3 |
| Dairy | 94,790 | 91,360 | 0 | 1,330 | 30 |
| Hogs | 51,770 | 47,850 | 0 | 1,485 | 52 |
| Broilers | 17,780 | 17,450 | 1,303 | 520 | 52 |
| Layers | 6,450 | 5,460 | 383 | 48 | 10 |
| Turkeys | 3,310 | 2,660 | 0 | 31 | 10 |
| Total | 237,820 ^{a/} | 227,120 ^{b/} | 2,326 | 3,825 | 172 ^{b/} |

Sources: Values presented in the table are EPA estimates, derived from published USDA data (Kellogg, 2002). All numbers are rounded to the nearest ten.

^{a/} USDA total include estimates of the number of operations with “cattle other than fattened cattle or milk cows” and also adjusts for double counting, accounting for roughly 42,000 operations (Kellogg, 2002). See Section 3. EPA’s total for broilers and egg layers also differs because of differing 1,000 AU definitions (see Section 3).

^{b/} Number of designated facilities shown over 5-year permit period. EPA assumes all estimated designated facilities are small businesses.

4.2.3 Results of the Initial Assessment for the 2001 Proposal

For past regulations, EPA has often analyzed the potential impacts to small businesses by evaluating the results of a costs-to-sales test, measuring the number of operations that will incur compliance costs at varying threshold levels (including ratios where costs are less than 1 percent, between 1 and 3 percent, and greater than 3 percent of gross income).³³ EPA conducted such an analysis at the time of the 2001 proposal, indicating that about 80 percent of the estimated number of small businesses directly subject to the rule as CAFOs might incur costs in excess of three percent of sales. These results were based on an assessment of the potential impacts on small CAFO businesses based on the results of a sales test for all operations with more than 500 AU. This screening test indicated the

³³ EPA believes that its more refined analysis used for its general analysis (presented in Section 3 of this EA) better reflects the potential impacts to regulated small businesses.

need for additional analysis to characterize the nature and extent of impacts on small entities. This assessment is conducted for those CAFOs that are small businesses, as determined by EPA.

The results of this screening test for the 2001 Proposal indicate that, measured against all confinement operations with more than 500 AU, about 80 percent of the estimated number of small businesses could incur costs in excess of 3 percent of sales. Compared to the total number of all small animal confinement facilities estimated by EPA, operations that are estimated to incur costs in excess of three percent of sales constitute less than two percent of all small businesses in these sectors. The results of this analysis are presented in Section 9.2.3 of the Proposal EA.

Based on the results of this initial assessment, EPA projected that it would likely not certify that the regulations would not impose a significant impact on a substantial number of entities. This is because EPA's initial assessment indicates that the regulations could impose a significant economic impact on a substantial number of entities. Therefore, prior to the 2001 Proposal, EPA convened a SBAR Panel and prepared an initial regulatory flexibility analysis (IRFA) pursuant to Sections 609(b) and 603 of the RFA, respectively, and prepared an economic analysis. Sections 4.3 and 4.4 of this report present the results of EPA's final regulatory flexibility analysis (FRFA).

4.3 EPA COMPLIANCE WITH RFA REQUIREMENTS

4.3.1 Outreach and Small Business Advocacy Review

As required by Section 609(b) of the RFA, as amended by SBREFA, EPA convened a SBAR Panel for the proposed rule. See 66 FR 3121-3124; 3126-3128 (January 12, 2001). The Panel was convened in December 1999. Panel participants included representatives from EPA, the Office of Information and Regulatory Affairs within the Office of Management and Budget (OMB), and the Office of Advocacy of the Small Business Administration (SBA). "Small Entity Representatives" (SERs), who advised the Panel, included small livestock and poultry producers as well as representatives of the major commodity and agricultural trade associations. Throughout the development of these regulations, EPA conducted outreach to small businesses in the livestock and poultry sectors. EPA also consulted with SBA on the use of an alternative definition of small business for the egg laying sector.

Consistent with the RFA/SBREFA requirements, the Panel evaluated the assembled materials and small entity comments on issues related to the elements of the IRFA. The Panel's activities and recommendations are summarized in the *Final Report of the Small Business Advocacy Review Panel on EPA's Planned Proposed Rule on National Pollutant Discharge Elimination System (NPDES) and Effluent Limitations Guideline (ELG) Regulations for Concentrated Animal Feeding Operations* (April 7, 2000), or "Panel Report" (USEPA, 2000e). This document is included in the public record (DCN 93001). Section 12 of the preamble to the 2001 Proposal provides a summary of the Panel's activities and recommendations and describes the subsequent action taken by the Agency (see 66 FR 3121-3124). Section 12 of the preamble to the 2001 Proposal also details various outreach activities conducted by EPA, which include outreach to small businesses in these sectors.

For the 2001 Proposal, EPA prepared an economic analysis of the impacts on small businesses, which is provided in Section 9.4 of the Proposal EA. EPA's economic analysis supporting the final regulations is provided in Section 4.4 of this report.

For all final regulations for which an FRFA is prepared, Section 212 of the RFA requires that the Agency also issue a small entity compliance guide providing a plain language explanation of how to comply with the final regulations. EPA's small entity compliance guide for the CAFO regulations will be issued following promulgation.

4.3.2 EPA's Final Regulatory Flexibility Analysis

For the proposed regulations, EPA has conducted an IRFA, as required by Section 603 of the RFA, as amended by SBREFA. The IRFA must contain the following: (1) a description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for, the proposed rule; (3) a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (4) a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and (5) identification, to the extent practicable, of all relevant Federal rules that might duplicate, overlap or conflict with the proposed rule. The IRFA shall also contain a description of any significant alternatives to the proposed rule that accomplish the stated objectives of applicable statutes and that minimize any significant economic impact of the proposed rule on small entities. Sections 9.3.2.1 through 9.3.2.6 of the Proposal EA show how EPA addressed each of these requirements in the IRFA it prepared to support the 2001 Proposal. EPA also prepared an economic analysis of the impacts on small CAFO businesses, which is provided in Section 9.4 of the Proposal EA (USEPA, 2001a).

For the final regulations, EPA has conducted an FRFA, as required by Section 604 of the RFA, as amended by SBREFA. The FRFA addresses the issues raised by public comments on the IRFA, which was part of the proposal of this rule. The FRFA must contain: (1) a succinct statement of the need for, and objectives of, the rule; (2) a summary of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a summary of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments; (3) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; (4) a description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and (5) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency that affect the impact on small entities was rejected. Sections 4.3.2.1 through 4.3.2.5 of this report address each of these FRFA requirements.

4.3.2.1 Need for and Objectives of the CAFO Regulations

A detailed discussion of the need for the regulation is presented in Section 4 of the 2001 Proposal (66 FR 2293-2972-2976). A summary is also provided in Sections 1 and 10 of the Proposal EA. In summary, EPA's rationale for revising the existing regulations include the following: address reports of continued discharge and runoff from livestock and poultry operations in spite of the existing

requirements; update the existing regulations to reflect structural changes in these industries over the past few decades; and improve the effectiveness of the existing regulations.

Despite nearly 30 years of regulation, there are persistent reports of discharge and runoff of manure and manure nutrients from livestock and poultry operations. Revisions to the existing ELG and NPDES regulations for CAFOs are expected to mitigate future water quality impairment and the associated human health and ecological risks by reducing pollutant discharges from the animal production industries.

EPA's revisions also address the changes that have occurred in the animal production industries in the United States since the development of the existing regulations. The continued trend toward fewer but larger operations, coupled with greater emphasis on more intensive production methods and specialization, is concentrating more manure nutrients and other animal waste constituents within some geographic areas. This trend has coincided with increased reports of large-scale discharges from these facilities and continued runoff that is contributing to the significant increase in nutrients and resulting impairment of many U.S. waterways.

EPA's revisions to the existing regulations will make the regulations more effective in protecting or restoring water quality. The revisions will also make the regulations easier to understand and will clarify the conditions under which an AFO is a CAFO and, therefore, subject to the regulatory requirements.

A detailed discussion of the objectives and legal basis for these regulations is presented in Sections 1 and 3 of the preamble to the final rule and also the 2001 Proposal (see: 66 FR 2959 or USGPO, 2001a).

4.3.2.2 Significant Comments in Response to the IRFA

The significant issues raised by public comments on the IRFA address exemptions for small businesses, disagreement with SBA definitions and guidance on how to define small businesses for these sectors, and general concerns about EPA's financial analysis and whether the analysis adequately captures potential financial effects on small businesses.

Commenters generally recommend that EPA exempt all small businesses from regulation, arguing in some cases that regulating small businesses could affect competition in the marketplace, discourage innovation, restrict improvements in productivity, create entry barriers, and discourage potential entrepreneurs from introducing beneficial products and processes. Several commenters claimed that EPA had misrepresented the number of small businesses. In particular, several commenters objected to SBA's small business definition for dairy operations, claiming it understates the number of small businesses in this sector (see, for example, NMPF, 2001). One commenter claimed that EPA's estimate of the total number of operations is understated and therefore must understate the number of small businesses (Department of Agriculture, 2001). Some commenters objected to the consideration of total farm-level revenue to determine the number of small businesses because this approach understates the number of small businesses, despite SBA guidance that bases its definitions on total entity revenue for purposes of defining a small business (NCBA, 2001). Other commenters, however, claimed that EPA's approach does not truly capture operations that are, in fact, small businesses but reflect larger corporate operations (see, for example, Citizens Against Poultry Pollution, 2001). Another commenter

recommended that EPA simply consider any operation with fewer than 1,000 AU as small businesses (Wyoming Office of Federal Land Policy, 2001). EPA also received comments requesting that EPA consider use of regional-specific definitions of small business because of concerns that the revenue-based SBA definition might not be applicable to operations in Hawaii since producers in that State generally face higher cost of production and also higher producer prices relative to revenue and cost conditions at farms in the contiguous 48 States. Comments from SBA recommended that EPA adopt the Panel's recommendation not to consider changing the designation criteria for operations with fewer than 300 animal units as a means to provide relief to small businesses (SBA, 2001). SBA also recommends that EPA adopt the SBAR Panel's approach and allow permitting authorities to focus resources where there is greatest need (SBA, 2001). Finally, some commenters generally questioned the results of EPA's financial analysis, giving similarly stated concerns about EPA's financial data and models used for its main analysis (see, for example, NCBA, 2001).

In response, EPA notes that the projected impacts of today's final regulations on small businesses are lower than the projected impacts of the proposed rule. For example, the final rule does not extend the effluent guideline regulations to CAFOs with between 300 and 1,000 AU, as was proposed in the 2001 proposal. Instead, EPA is retaining the existing regulatory threshold, applying the effluent guideline to CAFOs with more than 1,000 AU only. Requirements for CAFOs with between 300 and 1,000 AU will continue to be subject to the BPJ requirements as determined by the permitting authority, thus requiring that fewer small businesses adopt the effluent guideline standards. More information on this topic is available in section IV of this preamble. Section 4 of the final rule preamble discusses other regulatory changes since the 2001 proposal, indicating greater alignment with SBAR Panel recommendations. Refer to Section 4 of the preamble for more information on the comments and EPA's responses to those comments, as well as EPA's justification for final decisions on these options.

EPA received two comments from one commenter requesting that EPA not use the alternative definition for egg-laying operations but instead consider regional-specific conditions for determining the number of small businesses. The commenter expressed concern that SBA's revenue-based definition might not be applicable to operations in Hawaii since producers in that State generally face higher cost of production and also higher producer prices relative to revenue and cost conditions at farms in the contiguous 48 States. There are a number of reasons why EPA did not use a regional-specific definition of small business for egg operations. First, as instructed under the Regulatory Flexibility Act (RFA), EPA uses small business definitions as defined by the Small Business Administration (SBA) for all sectors (except for the egg-laying sector). Since size standards set by the Small Business Administration (SBA) do not vary by region, EPA follows SBA's lead. Second, the regulations set requirements by the number of animal units at a farm, not the revenues associated with those animal units. A 1,000 AU egg-laying operation in the Midwest will be subject to the same effluent limitations guidelines as a 1,000 AU egg-laying operation in Hawaii and the territories. Third, the economic analysis, uses a representative farm approach. Only the broadest regional information could be obtained through USDA and other sources. Although some small subregions or localities might face unique issues, without performing a Section 308 survey of all regulated entities EPA must rely on the representative farm approach. (See also response to comment DCN CAFO201246C-6 regarding EPA's use of a representative farm approach, which is consistent with longstanding practices at USDA and the land grant universities.) Fourth, very few impacts are seen in the egg-laying sector, regardless of size. Even if EPA had classified the majority of egg-laying operations with less than 1,000 AU as small businesses, this would not have changed the outcome of the Agency's small business analysis in any material way. Finally, even if EPA were to classify all operations as small businesses in areas outside the contiguous 48 States (including Hawaii and Alaska), this would only raise the total number of small business by less than 10 operations. See

response to comment DCN CAFO NODA600053-5 regarding EPA's consideration of regional-specific definition of small business for the regulated sectors.

Regarding EPA's estimate of the number of small businesses, the Agency continues to follow SBA guidance and SBA definitions on how to define small businesses for these sectors. However, EPA has made substantial changes to the financial data and models used for its main analysis, which is also used to evaluate financial effects on small businesses. Both the 2001 Notice (66 FR 58556) and the 2002 Notice (67 FR 48099) describe the public comments received by EPA on the baseline financial data and the methodological approach developed by the Agency to evaluate financial effects. These comments and how EPA has addressed them are discussed more fully throughout this report. EPA's detailed responses to comments, and the comments themselves, are contained in the Agency's comment response document (see, for example, DCN CAFO200179D-3).

4.3.2.3 Description and Estimate of Number of Small Entities Affected

The small entities subject to this rule are small businesses. No nonprofit organizations or small governmental operations operate CAFOs. As discussed in section 7 of the preamble to the final rule, to estimate the number of small businesses affected by this final rule, EPA relied on the SBA size standards for these sectors, with the exception of size definitions for the egg sector. SBA defines a "small business" in these sectors as an operation with average annual revenues of less than \$0.75 million for dairy, hog, broiler, and turkey operations; \$1.5 million in revenue for beef feedlots; and \$9.0 million for egg operations. The definitions of small business for the livestock and poultry industries are in SBA's regulations at 13 CFR 121.201. For this rule, EPA proposed and solicited public comment on and is using an alternative definition for small business for the egg-laying operations. EPA defines a "small" egg laying operation for purposes of its regulatory flexibility assessments as an operation that generates less than \$1.5 million in annual revenue. EPA consulted with SBA on the use of this alternative definition, as documented in the rulemaking record for the 2001 proposal. Given these considerations, EPA evaluates "small business" for this rule as an operation that houses or confines fewer than 1,400 fed beef cattle (includes fed beef, veal, and heifers); 300 mature dairy cattle; 2,100 market hogs; 37,500 turkeys; 61,000 layers; or 375,000 broilers. The approach used to derive these estimates is described in Section 4.2.

Using these definitions and available data from USDA and industry, EPA estimates that about 6,200 affected CAFOs across all size categories are small businesses. Among CAFOs with more than 1,000 AU, EPA estimates that about 2,330 operations are small businesses. Among CAFOs with between 300 and 1,000 AU, EPA estimates that about 3,870 operations are small businesses. Table 4.3 shows EPA's estimates of the number of regulated small businesses across all industry sectors. Table 4.4 provides this information by sector and by representative CAFO model.

Table 4-4. Numbers of Small CAFO Businesses by Sector, Size Grouping, and Region

| Sector | Region | Total | CAFOs "Large 1" | CAFOs "Large 2" | CAFOs "Medium 3" | CAFOs "Medium 2" | CAFOs "Medium 1" |
|-------------------|---------------|--------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Fed Cattle | All | 858 | 538 | | 49 | 95 | 176 |
| | CE | 605 | 342 | | 39 | 79 | 145 |
| | MW | 209 | 170 | | 8 | 11 | 20 |
| | PA | 28 | 23 | | 1 | 1 | 3 |
| | SO | 1 | 0 | | 0 | 0 | 1 |
| | MA | 15 | 3 | | 1 | 4 | 7 |
| Veal | MW | 12 | 5 | | 1 | 2 | 4 |
| Heifers | All | 329 | 97 | | 29 | 70 | 133 |
| | MW | 127 | 0 | | 6 | 14 | 107 |
| | CE | 120 | 58 | | 14 | 35 | 13 |
| | PA | 82 | 39 | | 9 | 21 | 13 |
| Dairy | All | 1,294 | | | | | 1,294 |
| | CE | 276 | | | | | 276 |
| | MW | 361 | | | | | 361 |
| | PA | 227 | | | | | 227 |
| | SO | 97 | | | | | 97 |
| | MA | 333 | | | | | 333 |
| Hog: FF | All | 916 | | | 123 | 252 | 541 |
| | MA | 811 | | | 105 | 216 | 490 |
| | MW | 105 | | | 18 | 36 | 51 |
| Hog: GF | All | 568 | | | 103 | 174 | 291 |
| | MA | 500 | | | 88 | 148 | 264 |
| | MW | 68 | | | 15 | 26 | 27 |
| Broiler | All | 1,822 | 1,034 | 269 | 184 | 197 | 138 |
| | MA | 1,223 | 698 | 182 | 120 | 133 | 90 |
| | SO | 599 | 336 | 87 | 64 | 64 | 48 |
| Layer: Dry | All | 59 | | | | 21 | 38 |
| | MW | 29 | | | | 10 | 19 |
| | SO | 30 | | | | 11 | 19 |
| Layer: Wet | SO | 431 | 383 | | 48 | | |
| Turkey | All | 26 | | | | 9 | 17 |
| | MA | 14 | | | | 5 | 9 |
| | MW | 12 | | | | 4 | 8 |

Source: USEPA. Preliminary based on estimates associated with the August 4, 2002, cost estimates. Size and region breakouts are based on an analysis of the 1997 Census data by USDA (Kellogg, 2002). Facility size and region definitions for model CAFOs are provided in Section 2, Table 2-1. Shaded cells indicate that there are no small CAFO businesses that will be affected by the regulations and that meet the SBA definition of a small business. Estimates do not include number of designated CAFOs.

4.3.2.4 Description of the Reporting, Recordkeeping, and Other Requirements

The final regulations would require all AFOs that meet the CAFO definition to apply for a permit, develop and implement a nutrient management plan, collect and maintain records required by applicable technology-based effluent discharge standards, and submit an annual report to the responsible NPDES permitting authority. (No nonprofit organizations or small governmental operations operate CAFOs.) All CAFOs would also be required to maintain records of off-site transfers of manure. Record-keeping and reporting burdens include the time to record and report animal inventories, manure generation, field application of manure (amount, method, date, weather conditions), manure and soil analysis results, crop yield goals, findings from visual inspections of feedlot areas, and corrective measures. Records may include manure spreader calibration worksheets, manure application worksheets, maintenance logs, and soil and manure test results. EPA believes the owner/operator has the skills necessary to keep these records and make reports to the permitting authority.

State permitting authorities will incur reporting burdens when they update their NPDES programs to incorporate the regulatory changes in the final rule. They will incur record keeping burdens as they implement the final rule. Data collection and record keeping activities include reviewing CAFO permit applications and periodic reports, and tracking compliance through on-site inspections.

EPA has estimated the burden and costs associated with information collection imposed on CAFOs, including small businesses, and also States as a result of the CAFO regulations. This analysis is provided in the Information Collection Request for the Final NPDES and ELG Regulatory Revisions for Concentrated Animal Feeding Operations (EPA ICR NO. 1989.02) prepared by EPA (USEPA, 2002j), which updates an analysis conducted for the 2001 Proposal (USEPA, 2000f).

For the purpose of this analysis, "burden" means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust existing procedures to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information request; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

EPA's labor burden estimates for CAFO and State respondents are the hours of activity required to comply with changes to the NPDES CAFO program. For each activity, EPA estimates the burden in terms of the expected effort necessary to carry out these activities under normal conditions and reasonable labor efficiency. These activities and estimated burden and cost levels are described in more detail in the Supporting Statement for the ICR (USEPA, 2002j). The ICR also contains a summary of wage rate information from USDA and the Bureau of Labor Statistics, compiled by EPA for the purpose of this analysis. Additional information on the ICR is provided in the preamble supporting the final regulations. A summary of the analysis of impacts to CAFO operators is provided below. Additional information on the estimated burden and costs is provided in the ICR (USEPA, 2002j).

EPA identifies four burden categories to CAFO operators, including start-up activities, permit application, best available technology requirements, and NPDES record keeping and reporting requirements.

Start-up activities are steps that a CAFO owner or operator must take in preparation to comply with the information collection requirements of the final rule. Owners or operators that are potentially affected by the rule will need to familiarize themselves with the changes to the NPDES CAFO program to determine that they will need to apply for a permit.

Permit application activities include completing and submitting either an NOI to obtain coverage under a general permit or an application for an individual permit. These activities will be conducted once every five years. The final rule requires that the following information be provided on the application forms: the name of the owner or operator; facility address and mailing address; latitude and longitude of the production area; a topographic map; the type and number of animals in open confinement and housed under a roof; the type of containment and total capacity for manure, litter, and wastewater storage; the number of acres for land application; the estimated amount of manure generated per year; and estimated amount of manure transferred off site each year. As part of their record keeping responsibilities, CAFO operators will be required to keep the plan on site for inspections and make it available to the permitting authority on request. Nutrient management plans must be reviewed and rewritten at least every five years.

CAFO owners or operators will perform and record various activities to meet the BAT requirements such as visual inspections of the feedlot facilities, inspections of manure application equipment, collection of soil samples, and recording of volume of manure and process wastewater produced. CAFOs with more than 1,000 AU will also be required to record information for transfers of manure, litter, and process wastewater to other people.

In addition to the labor costs associated with these activities, EPA estimates the capital and operation and maintenance (O&M) costs incurred to collect data and keep records. A CAFO will incur capital costs when it purchases equipment or builds structures that are needed for compliance with the rule's reporting and record keeping requirements that the facility would not use otherwise. Consistent with the overall cost analysis for the final rule, capital costs are annualized assuming a 10-year amortization period and a 7 percent interest rate. Capital costs for the final rule include such items as purchasing a soil auger to collect soil samples and a manure sampler. Some facilities will also need to install depth markers in their lagoons. A facility incurs O&M costs when it regularly uses services, materials, or supplies needed to comply with the rule's reporting and record keeping requirements that the facility will not use otherwise. Any cost for the operation and upkeep of capital equipment is considered an O&M cost. O&M costs may also be incurred on a non-annual basis, such as every five years for a soil analysis. O&M costs include laboratory analysis of soil and manure.

EPA estimates that the public burden for this information collection request will require 1.6 million labor hours for all CAFO respondents to comply with the final regulations and 0.3 million labor hours for State permitting authority respondents (USEPA, 2002j). Information collection and reporting at a CAFO is associated with applying for permits, developing nutrient management plans, conducting site inspections, tracking land application and off-site manure transfers. These estimates include the time required to review instructions, search existing data sources, gather and maintain all necessary data, and complete and review the information collection. EPA estimates costs to regulated CAFOs at \$29 million annually, which includes \$25 million in labor costs and \$4 million capital and O&M expenditures; annual State costs of \$10 million include \$8.6 million in labor costs and \$1.6 million in O&M expenditures (USEPA, 2002j). This estimate excludes NPDES burden for CAFOs covered by other ICR estimates.

Under the final rule, EPA estimates that there will be an annual average of 11,712 CAFO respondents and an annual average of 82,705 CAFO responses, which includes multiple responses per CAFO. Thus, the annual average burden per CAFO respondent is 138 hours and the average burden per CAFO response is 19 hours. For this analysis, EPA assumes that the administrative burden assumptions are generally the same regardless of CAFO size. The annual average burden per State respondent is 10,152 and the average burden per response is 16 hours (USEPA, 2002j).

More detailed information on the burden and associated costs for each of the activities described above is provided in the ICR (USEPA, 2002j). Section 10 of the final rule preamble further summarizes the expected reporting and record-keeping requirements under the final regulations based on information compiled as part of the *Information Collection Request for the Final NPDES and ELG Regulatory Revisions for Concentrated Animal Feeding Operations* (OMB ICR NO. 2040-0250) prepared by EPA.

4.3.2.5 Steps Taken to Minimize Significant Economic Impacts on Small Entities

For the final regulations, EPA has adopted an approach for a regulatory program that mitigates impacts on small business, recognizes and promotes effective non-NPDES State programs, and works in partnership with USDA to promote environmental stewardship through voluntary programs, and financial and technical assistance. EPA's proposal included many options that were not finally adopted in deference to these principles.

Because of the estimated impacts on small entities EPA is not certifying that this rule will not impose a significant impact on a substantial number of small entities. EPA has complied with all RFA provisions and conducted outreach to small businesses, convened a SBAR panel, prepared an Initial Regulatory Flexibility Analysis (IRFA) and a Final Regulatory Flexibility Analysis (FRFA), and also prepared an economic analysis. The Agency's actions include the following efforts to minimize impacts on small businesses:

- Retained structure of existing regulations, which allows EPA and states to focus on the largest producers;
- Retained existing designation criteria and process;
- Retained existing definition of an AFO;
- Retained conditions for being defined as a Medium CAFO;
- Eliminated the "mixed" animal calculation for operations with more than a single animal type for determining which AFOs are CAFOs;
- Raised the duck threshold for dry manure handling duck operations; and
- Adopted a dry-litter chicken threshold higher than proposed.

EPA went to some length to explore and analyze a variety of ELG regulatory alternatives to minimize impacts on small businesses. The record for today's rule includes extensive discussions of the alternatives, EPA's analysis of those alternatives, and the rationale for the Agency's decisions. In large part, the Agency incorporated most of the alternative considerations to reduce the burden to small businesses. By way of example, today's regulations will affect fewer small businesses at significantly reduced costs, as compared to the estimates of the number of operations and expected costs to those affected entities based on the requirements set forth in the 2001 proposal. For more information on EPA's option selection rationale, see Section 4 of the preamble to the final rule.

4.4 EPA'S ANALYSIS OF SMALL BUSINESS IMPACTS

This section discusses the data and methodology EPA uses to assess economic impacts on small CAFO businesses (Section 4.4.1) and presents the results of this analysis (Section 4.4.2). This economic analysis supports the FRFA (Section 4.3) by quantifying the effects of the CAFO regulations. Based on the results of this analysis, EPA has determined that the CAFO regulations would result in financial stress to some affected small businesses, but not a substantial number of operations relative to the total number of affected small businesses in these sectors.

4.4.1 Data and Methodology

To examine the economic impacts of the final regulations on small CAFO businesses, EPA uses the same representative farm approach that is used to analyze impacts on all CAFOs (regardless of size), as described in Section 2 of this EA.³⁴ This approach evaluates impacts on select model CAFOs and extrapolates these results to the number of operations identified by each representative model, thus aggregating costs nationally across all sectors. Inputs for this analysis include the number of CAFOs represented by each model (see Section 4.3.3) and, for each model CAFO, the costs of the final regulations and selected financial characteristics (see Section 2).

EPA's analysis evaluates the economic achievability of the final regulatory options at small CAFO businesses based on financial criteria established for this analysis. These criteria reflect a combination of both farm level and enterprise level criteria. Three farm level criteria are assessed: (1) a comparison of incremental costs to total revenue (sales test), (2) projected post-compliance cash flow over a 10-year period, and (3) an assessment of an operation's debt-asset ratio under a post-compliance scenario. Projected post-compliance cash flow over a 10-year period is also assessed at the enterprise level in order to evaluate the potential effects at a facility's livestock or poultry enterprise, apart from the effects assessed for the entire facility.

EPA used the results from these analyses to divide affected CAFOs into three financial impact categories: Affordable, Moderate, and Stress. CAFOs experiencing affordable or moderate impacts are considered to experience some financial impact on operations, but EPA does not expect the costs of complying with this rule to make such operations vulnerable to closure. EPA considers that for CAFOs in both the "Affordable" and "Moderate" impact categories the final requirements are economically achievable. Operations experiencing financial stress, however, are considered to be vulnerable to closure because of the costs of this rule. EPA considers that for CAFOs in the "Stress" impact category, the final requirements might not be economically achievable, subject to other considerations. For more information on this decision framework, see Table 2-8 and Figure 2-1.

EPA conducted its analysis first at the farm level based on data reflecting financial conditions for the entire farm operation (e.g., reflecting income and cost information spanning the entire operation, thus

³⁴ For past regulations, EPA has often analyzed the potential impacts to small businesses by evaluating the results of a costs-to-sales test, measuring the number of operations that will incur compliance costs at varying threshold levels. EPA conducted such an analysis at the time of the 2001 proposal, but believes that its more refined analysis used for its general analysis better reflects the potential impacts to regulated small businesses.

considering the operation's primary livestock production, along with other income sources such as secondary livestock and crop production, government payments, and other farm-related income). Based on the farm level results, EPA also assessed the financial effects on CAFOs at the enterprise level (e.g., limiting the scope of the assessment to the operation's livestock or poultry enterprise, and excluding other non CAFO-related sources of income from the analysis).

Starting with the farm level analysis, EPA considers the regulations to be economically achievable for a representative model CAFO if the average operation has a post-compliance sales test estimate within an acceptable range, a positive post-compliance cash flow over a 10-year period, and a post-compliance debt-to-asset ratio not exceeding a benchmark value. Specifically, if the sales test shows that compliance costs are less than 3 percent of sales, or if post-compliance cash flow is positive and the post-compliance debt-to-asset ratio does not exceed a benchmark (depending on the baseline data) and compliance costs are less than 5 percent of sales, EPA considers the options to be "Affordable" for the representative CAFO group. (Although a sales test result of less than 3 percent does indicate "Affordable" in the farm level analysis, further analysis is conducted to determine the effects at the operation's livestock or poultry enterprise.) The benchmark values assumed for the debt-asset test are sector-specific. EPA assumes a 70 percent benchmark value for the debt-asset test to indicate financial stress in the hog and dairy sectors, and an 80 percent benchmark for the debt-asset test to indicate financial stress in the beef cattle sector. These benchmark values address public comment received and alternative debt and asset data submitted for the livestock sectors. For the poultry sectors, however, EPA did not obtain alternative debt and asset data and continues to evaluate data used for proposal against a 40 percent benchmark value.

A sales test of greater than 5 percent but less than 10 percent of sales with positive cash flow and a debt-to-asset ratio of less than these sector-specific debt-asset benchmark values is considered indicative of some impact at the CAFO level, but at a level not as severe as those indicative of financial distress or vulnerability to closure. These impacts are labeled "Moderate" for the representative CAFO group. EPA considers both the "Affordable" and "Moderate" impact categories to be economically achievable by the CAFO, subject to the enterprise analysis (see below). If, with a sales test of greater than 3 percent, post-compliance cash flow is negative or the post-compliance debt-to-asset ratio exceeds these sector-specific debt-asset benchmarks, or if the sales test shows costs equal to or exceeding 10 percent of sales, EPA considers the final regulations to be associated with potential financial stress for the entire representative CAFO group. In such cases, each of the operations represented by that group might be vulnerable to closure. For operations that are determined to experience financial "Stress" at the farm level, the final requirements are likely not economically achievable.

The enterprise level analysis builds on the farm level analysis, evaluating effects at a farm's livestock or poultry enterprise. If the farm level analysis shows that the regulations impose "Affordable" or "Moderate" effects on the operation, the enterprise level analysis is conducted to determine whether the enterprise's cash flow is able to cover the cost of regulations. This analysis uses a discounted cash flow approach similar to that used to assess the farm level effects, in which the net present value of cash flow is compared to the net present value of the total cost of the regulatory options over the 10-year time frame of the analysis. Over the analysis period, if an operation's livestock or poultry enterprise maintains a cash flow stream that both exceeds the cash costs of the rule (operating and maintenance costs plus interest) and covers the net present value of the principal payments on the capital, EPA concludes that the enterprise will likely not close because of the CAFO rule. This analysis is conducted on a pass/fail basis. If the net present value of cash flow minus the net present value of the rule's costs is greater than zero, the enterprise passes the test and the enterprise is assumed to continue to operate. EPA

considers these results to indicate that the final requirements are economically achievable. If the net present value of cash flow is not sufficient to cover the net present value of the cost of the rule, EPA assumes that the CAFO operator would consider shutting down the livestock or poultry enterprise. That is, if an operation fails the enterprise level analysis, these operations are determined to experience financial “Stress” and the final requirements are likely not economically achievable.

More detail on the classification scheme established for this analysis, along with a discussion of the basis for EPA’s use of these criteria, is provided in Section 2. Section 2.3. presents the baseline (farm and enterprise level) financial data that EPA uses to analyze impacts on small CAFO businesses.

Appendix B shows EPA’s estimated compliance costs for selected model CAFOs under the final BAT Option. These costs reflect the range of facility level costs for model CAFOs based on estimated per-unit costs aggregated by the average number of animals assumed for each model. All costs shown are expressed on a per-animal basis and are differentiated by facility size, producing region, facility types, and other factors. Costs are reported in ranges across three types of land availability for manure application and also across three types of technology needs assumed for model CAFOs for the purpose of this analysis. The land availability types include: Category 1 farms, which have sufficient cropland for all on-farm nutrients generated; Category 2 farms, which have insufficient cropland; and Category 3 farms, which have no cropland. USDA data/information grouping facilities into the categories of technology adoption and use are: “least needs” and “most needs” operations (assumed to account for 25 percent each of all facilities) and also “average needs” (assumed to account for 50 percent of all operations). These groupings are based on available USDA data; detailed information is available in the *Development Document* supporting the proposed regulations (USEPA, 2002). Section 2 provides a summary on EPA’s engineering cost models.

To estimate financial effects on operations with between 300 and 1,000 AU that may be defined as CAFOs under the NPDES permit regulations, EPA assumes that the estimated costs for CAFOs with between 300 and 1,000 AU to comply with the effluent guideline regulations are similar to the costs that will be incurred by sized operations of that size to comply with BPJ requirements under the revised NPDES regulations. Because the costs to comply with the effluent guideline represent the likely high end of the possible cost range, estimated impacts on operations in this size range might be overstated.

To estimate financial effects on expected designated facilities, EPA uses the same general approach described in Section 2 of this report to assess impacts on an estimated 344 designated facilities over a 10-year period.³⁵ For this analysis EPA uses estimated costs for the smallest size model CAFO among operations with between 300 and 1,000 AU (“Medium” operations)³⁶ for model CAFOs developed for operations located in the more traditional production regions (Midwest for the livestock and turkey operations and South for the broiler and egg-laying operations; Table 2-1 shows these definitions). For example, EPA assumes that operations characterized as having available land for land application of manure (Category 1 model facilities) and high technology needs (“most needs” or Category H) may be characterized as Category 1H models for purposes of costing across the range of

³⁵ As shown in Table 3-3, EPA estimates 172 designated facilities over a 5-year permit period. For the purpose of this analysis, EPA assumes that half are expected to be designated during the first 5 years, and the other half, in the second 5 years.

³⁶ Medium 3 for wet layer operations.

land base and technology needs cost models. These cost estimates are shown in Appendix B. More detailed cost information is provided in the *Development Document* (USEPA, 2002).

For CAFOs with between 300 to 1,000 AU, operations are distributed in the key regions (Midwest or South) in the key category group (Category 1H) across the Medium 1, 2, and 3 model sizes. For all sectors excluding hog, the farm counts are distributed evenly across these three size groups. The hog models are more complex, because the engineering costs are divided by size, region, operation type (farrow finish and grow finish) and manure process (liquid and pit for Medium models), and the financial models are divided by size, region, and contract versus independent, and so forth, leading to a much larger matrix of models than those for other sectors. The designated counts were distributed in a ratio of NPDES farm counts over the Medium 1, 2, and 3 models for liquid and pit manure processes, by contract vs. independent and by farrow finish and grow finish in the Midwest 1H categories. For designated CAFOs with fewer than 300 AU, operations are placed in one model for each sector, with the exception of hog facilities. Hog operations are distributed evenly among the model types (manure process by grow finish or farrow finish and by contract versus independent). Costs for these “Small” models are developed using the Medium 1, Category 1H costs for each sector (or in the case of hog, each process and operation type). The cost per head for the Medium 1, 1H operation was applied to an assumed 300 AU number of head to estimate an annualized compliance cost per “small” facility. Because there was no Medium 1 size for wet layer, the Medium 3 size group per head cost was applied to the number of head associated with 300 AU.

4.4.2 Economic Analysis Results

Using the economic achievability criteria established for this analysis, discussed in Section 4.4.1, EPA’s economic analysis indicates that the CAFO regulations will not impose financial stress on a substantial number of operations, relative to the total number of affected confinement operations in these sectors. The results of this analysis are presented in Table 4-5.

EPA estimates that about 6,200 small business CAFOs would be affected by this rule. For this analysis, EPA estimates that about 6,200 affected CAFOs are small businesses, consisting of about 2,330 operations with more than 1,000 AU and about 3,830 operations with between 300 and 1,000 AU. Most of these affected small businesses are in the hog, dairy, and broiler sectors.³⁷

In examining the effects on small businesses for the final rule, EPA followed the same approach used to evaluate the impacts on existing CAFOs, as described in Section ES.2. For the purposes of this analysis, EPA assumes that small business CAFOs with between 300 and 1,000 AU would incur costs similar to those estimated for CAFOs with more than 1,000 AU (although these smaller-sized operations will be subject to BPJ and not the ELG requirements under the revised NPDES requirements). These upper end cost estimates could, therefore, overstate the financial effects for small businesses in this size category. For past regulations, EPA has often analyzed the potential impacts to small businesses by evaluating the results of a costs-to-sales test, measuring the number of operations that will incur compliance costs at varying threshold levels (including ratios where costs are less than 1 percent,

³⁷ For reasons noted in the record, EPA believes that the number of small broiler operations is overestimated and might actually include a number of medium and large broiler operations that should not be considered small businesses.

between 1 and 3 percent, and greater than 3 percent of gross income). EPA conducted such an analysis at the time of the 2001 proposal, indicating that about 80 percent of the estimated number of small businesses directly subject to the rule as CAFOs might incur costs in excess of three percent of sales. EPA believes that its more refined analysis used for its general analysis (presented here) better reflects the potential impacts to regulated small businesses.

Using this approach, EPA's analysis indicates that the final rule could cause financial stress to some small businesses, making these businesses vulnerable to closure. These results are presented in Table 4-5a (Option 1) and Table 4-5b (Option 2).

For Option 1, the analysis indicates that, among all small business CAFOs in the veal, dairy, hog, turkey, and egg-laying sectors, the impacts due to this rule can be characterized as "Affordable" or "Moderate." EPA estimates that a total of 172 small businesses (3 percent of all small business CAFOs with more than 300 AU) would experience financial stress and might be vulnerable to closure. By sector, these closures are comprised of about 131 small businesses in the beef sector, 38 businesses in the heifer sector, and 3 businesses in the broiler sector. Most of these (nearly 90 percent) are operations with fewer than 1,000 AU. For Option 2, the analysis indicates that, among all small business CAFOs in the veal, dairy, hog, turkey, and egg-laying sectors, the impacts due to this rule can be characterized as "Affordable" or "Moderate." EPA estimates that a total of 262 small businesses (4 percent of all small business CAFOs with more than 300 AU) would experience financial stress and might be vulnerable to closure. By sector, these closures are comprised of about 183 small businesses in the beef sector, 50 businesses in the heifer sector, and 19 businesses in the broiler sector. Nearly 90 percent of these potential closures are operations with fewer than 1,000 AU.

These estimates of the number of potential CAFO closures are cumulative and reflect the results of both the farm level analysis and the enterprise level analysis. These results are based on an analysis that does not consider the longer term effects on market adjustment and also available cost-share assistance from Federal and State farm conservation programs. EPA believes that such adjustments could lessen the economic impacts of the final regulations over time.

Table 4-5 shows the results of this analysis aggregated across all estimated designated operations with less than 1,000 AU, indicating that nearly one-half of all designated operations may go out of business. Closures among designated operations are all in the broiler, beef, and heifer sectors.

Table 4-5a. Results of EPA's Small Business Analysis (Option 1)

| Sector | Number of Small CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--|-----------------------|------------|----------|--------|-------------------------------|----------|--------|
| | | (Number) | | | (Percent of Total Operations) | | |
| CAFOs >1000 AU (excl. designated operations) | | | | | | | |
| Fed Cattle | 712 | 581 | 0 | 131 | 82% | 0% | 18% |
| Veal | 12 | 12 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 327 | 289 | 0 | 38 | 88% | 0% | 12% |
| Dairy | 1,330 | 1,330 | 0 | 0 | 100% | 0% | 0% |
| Hogs | 1,485 | 1,485 | 0 | 0 | 100% | 0% | 0% |
| Broilers | 1,823 | 1,395 | 424 | 3 | 77% | 23% | 0% |
| Layers: Dry | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 407 | 407 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 31 | 31 | 0 | 0 | 100% | 0% | 0% |
| Total | 6,151 | 5,554 | 424 | 172 | 90% | 7% | 3% |
| CAFOs >1,000 AU | | | | | | | |
| Fed Cattle | 538 | 533 | 0 | 5 | 99% | 0% | 1% |
| Veal | 5 | 5 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 97 | 97 | 0 | 0 | 100% | 0% | 0% |
| Dairy | 0 | -- | -- | -- | -- | -- | -- |
| Hogs | 0 | -- | -- | -- | -- | -- | -- |
| Broilers | 1,303 | 1,065 | 234 | 3 | 82% | 18% | 0% |
| Layers: Dry | 0 | -- | -- | -- | -- | -- | -- |
| Layers: Wet | 383 | 383 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 0 | -- | -- | -- | -- | -- | -- |
| Total | 2,326 | 2,083 | 234 | 8 | 90% | 10% | 0% |

Table 4-5a. Results of EPA's Small Business Analysis (Option 1)

| Sector | Number of Small CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--|-----------------------|------------|----------|--------|-------------------------------|----------|--------|
| | | (Number) | | | (Percent of Total Operations) | | |
| Operations 300 - 1,000 AU (Defined as CAFOs) | | | | | | | |
| Fed Cattle | 174 | 48 | 0 | 126 | 27% | 0% | 73%* |
| Veal | 7 | 7 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 230 | 192 | 0 | 38 | 83% | 0% | 17% |
| Dairy | 1,330 | 1,330 | 0 | 0 | 100% | 0% | 0% |
| Hogs | 1,485 | 1,485 | 0 | 0 | 100% | 0% | 0% |
| Broilers | 520 | 330 | 190 | 0 | 63% | 37% | 0% |
| Layers: Dry | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 31 | 31 | 0 | 0 | 100% | 0% | 0% |
| Total | 3,825 | 3,471 | 190 | 164 | 91% | 5% | 4% |
| Operations <1,000 AU (Designated as CAFOs) | | | | | | | |
| Fed Cattle | 30 | 4 | 0 | 26 | 13% | 0% | 87% |
| Veal | 0 | 0 | 0 | 0 | NA | NA | NA |
| Heifer | 6 | 0 | 0 | 6 | 0% | 0% | 100% |
| Dairy | 60 | 60 | 0 | 0 | 100% | 0% | 0% |
| Hogs | 104 | 104 | 0 | 0 | 100% | 0% | 0% |
| Broilers | 104 | 0 | 0 | 104 | 0% | 0% | 100% |
| Layers: Dry | 4 | 4 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 16 | 16 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 20 | 20 | 0 | 0 | 100% | 0% | 0% |
| Total | 344 | 208 | 0 | 136 | 61% | 0% | 40% |

Source: USEPA. May not add due to rounding. Does not include the number of CAFOs includes designated facilities. Assumes that the costs that will be incurred by those sized operations to comply with BPJ-based limitations under the revised NPDES regulations are similar to the estimated costs that would be incurred if Medium CAFOs had to comply with the ELG.

"Layers: dry" are operations with dry manure systems. "Layers: wet" are operations with liquid manure systems.

Table 4-5b. Results of EPA's Small Business Analysis (Option 2)

| Sector | Number of Small CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--|-----------------------|------------|----------|--------|-------------------------------|----------|--------|
| | | (Number) | | | (Percent of Total Operations) | | |
| CAFOs >1000 AU (excl. designated operations) | | | | | | | |
| Fed Cattle | 712 | 529 | 0 | 183 | 74% | 0% | 26% |
| Veal | 12 | 12 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 327 | 277 | 0 | 50 | 85% | 0% | 15% |
| Dairy | 1,330 | 1,306 | 24 | 0 | 98% | 2% | 0% |
| Hogs | 1,485 | 1,483 | 2 | 0 | 100% | 0% | 0% |
| Broilers | 1,823 | 1,026 | 780 | 19 | 56% | 43% | 1% |
| Layers: Dry | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 407 | 407 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 31 | 31 | 0 | 0 | 100% | 0% | 0% |
| Total | 6,151 | 5,129 | 806 | 262 | 83% | 13% | 4% |
| CAFOs >1,000 AU | | | | | | | |
| Fed Cattle | 538 | 522 | 0 | 16 | 97% | 0% | 3% |
| Veal | 5 | 5 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 97 | 88 | 0 | 9 | 91% | 0% | 9% |
| Dairy | 0 | -- | -- | -- | -- | -- | -- |
| Hogs | 0 | -- | -- | -- | -- | -- | -- |
| Broilers | 1,303 | 763 | 532 | 9 | 58% | 41% | 1% |
| Layers: Dry | 0 | -- | -- | -- | -- | -- | -- |
| Layers: Wet | 383 | 383 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 0 | -- | -- | -- | -- | -- | -- |
| Total | 2,326 | 1,795 | 532 | 34 | 76% | 23% | 1% |

Table 4-5b. Results of EPA's Small Business Analysis (Option 2)

| Sector | Number of Small CAFOs | Affordable | Moderate | Stress | Affordable | Moderate | Stress |
|--|-----------------------|------------|----------|--------|-------------------------------|----------|--------|
| | | (Number) | | | (Percent of Total Operations) | | |
| Operations 300 - 1,000 AU (Defined as CAFOs) | | | | | | | |
| Fed Cattle | 174 | 7 | 0 | 167 | 4% | 0% | 96% |
| Veal | 7 | 7 | 0 | 0 | 100% | 0% | 0% |
| Heifer | 230 | 189 | 0 | 41 | 82% | 0% | 18% |
| Dairy | 1,330 | 1,306 | 24 | 0 | 98% | 2% | 0% |
| Hogs | 1,485 | 1,483 | 2 | 0 | 100% | 0% | 0% |
| Broilers | 520 | 263 | 248 | 10 | 51% | 48% | 1% |
| Layers: Dry | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 24 | 24 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 31 | 31 | 0 | 0 | 100% | 0% | 0% |
| Total | 3,825 | 3,334 | 274 | 228 | 87% | 7% | 6% |
| Operations <1,000 AU (Designated as CAFOs) | | | | | | | |
| Fed Cattle | 30 | 4 | 0 | 26 | 13% | 0% | 87% |
| Veal | 0 | 0 | 0 | 0 | NA | NA | NA |
| Heifer | 6 | 0 | 0 | 6 | 0% | 0% | 100% |
| Dairy | 60 | 60 | 0 | 0 | 100% | 0% | 0% |
| Hogs | 104 | 104 | 0 | 0 | 100% | 0% | 0% |
| Broilers | 104 | 0 | 0 | 104 | 0% | 0% | 100% |
| Layers: Dry | 4 | 4 | 0 | 0 | 100% | 0% | 0% |
| Layers: Wet | 16 | 16 | 0 | 0 | 100% | 0% | 0% |
| Turkeys | 20 | 20 | 0 | 0 | 100% | 0% | 0% |
| Total | 344 | 208 | 0 | 136 | 61% | 0% | 40% |

Source: USEPA. May not add due to rounding. Does not include the number of CAFOs includes designated facilities. Assumes that the costs that will be incurred by those sized operations to comply with BPJ-based limitations under the revised NPDES regulations are similar to the estimated costs that would be incurred if Medium CAFOs had to comply with the ELG.

“Layers: dry” are operations with dry manure systems. “Layers: wet” are operations with liquid manure systems.

EPA believes that the estimated financial impacts shown in Tables 4-5(a) and 4.5(b) represent the worst case. The reasons are summarized below.

First, all results are estimated assuming no costs can be passed through between CAFOs and the processing sectors. As discussed in Section 3 of this report, if modest levels of cost passthrough are assumed in the broiler sectors, the BAT requirements are affordable to all small broiler operations. EPA did not evaluate economic impacts on cattle operations under a cost passthrough scenario; however, it is expected that long-run market and structural adjustment by producers in this sector will diminish the estimated impacts. Even without an assumption of cost passthrough, EPA's analysis shows that adverse impacts will not be experienced by a substantial number of operations, as compared to the number of affected operations in these sectors. EPA has conducted an extensive literature review of issues concerning cost passthrough. Based on the results of the available empirical research on market power and price transmission in these industries, EPA believes that there is little evidence to support the position that increased production costs may not be passed through the market levels. A summary of this literature review is provided in the rulemaking record (ERG, 2000c — DCN 70640).

Second, as noted in the SBAR Panel Report, EPA believes that the number of small broiler operations is overestimated. In the absence of business level revenue data, EPA estimates the number of "small businesses" using the approach described in Section 4.2. Using this approach, virtually all (>99.9 percent) broiler operations are considered "small" businesses. This categorization may not accurately portray actual small operations in this sector because it classifies a 15- to 20-house broiler operation with 375,000 birds as a small business. Information from industry sources suggests that a two-house broiler operation with roughly 50,000 birds is more appropriately characterized as a small business in this sector (Madison, 1999; Staples, 1998). Therefore, it is likely that the number of small broiler operations might include a number of medium and large size broiler operations being considered small entities. As discussed in Section 9.2.1 of the Proposal EA, EPA consulted with SBA on the use of an alternative definition for small businesses in all affected sectors based on animal inventory at an operation during the development of the rulemaking.

Third, EPA believes that a costs-to-sales comparison is a crude measure of impacts on small business in sectors where production contracting is commonly used, such as in the broiler sector (and also in the turkey, egg, and hog sectors, though to a lesser extent). As discussed in Section 4.2.4.5 of the Proposal EA, lower reported operating revenues in the broiler sector reflect the predominance of contract growers in this sector. Contract growers receive a prenegotiated contract price that is lower than the USDA-reported producer price, thus resulting in lower gross revenues at these operations (USDA/ERS, 1996b; Perry et al., 1999; Farm Journal, 1998). Lower producer prices among contract growers are often offset by lower overall production costs at these operations, because the affiliated processor firm pays for a substantial portion of the grower's annual variable cash expenses. Inputs supplied by the integrator may include feeder pigs or chicks, feed, veterinary services and medicines, technical support, and transportation of animals (USDA, 1996a). These variable cash costs compose a large component of annual operating costs, averaging more than 70 percent of total variable and fixed costs at livestock and poultry operations (USDA/ERS, 1999a). The contract grower also faces reduced risk because the integrator guarantees the grower a fixed output price (see Section 2 of the Proposal EA for more information on contracting in animal agriculture). Because production costs at a contract grower operation are lower than that at an independently owned operation, a profit test (costs-to-profit comparison) is a more accurate measure of impacts at grower operations. However, financial data are not available that differentiate between contract grower and independent operations.

Fourth, EPA's initial regulatory flexibility analysis also does not consider a range of potential cost offsets available to most farms. As discussed in Section 2.4 of this report, one source of potential cost offset is cost share and technical assistance available to farmers for on-farm improvements from various State and Federal programs, such as the Environmental Quality Incentives Program (EQIP) administered by USDA. Cost sharing for eligible producers under EQIP may cover up to 75 percent of the costs of certain conservation practices, such as grassed waterways, filter strips, manure management facilities, capping of abandoned wells, and other practices important to improving and maintaining the health of natural resources in the area. Technical assistance is also available for formulating conservation plans. In the Spring of 2002, new Farm Bill legislation passed by Congress might significantly raise government expenditures for this program. Total EQIP authorization for FY 2002 to FY 2007 is \$5.8 billion, ranging from \$400 million to \$1.3 billion per year over the period. This compares to current authorized levels of about \$200 million per year. The new legislation targets 60 percent of available EQIP funds to livestock and poultry producers, including confinement and grass-based systems. The new legislation also removed the previous EQIP eligibility requirements that restricted funding for certain structural practices to operations with fewer than 1,000 AU (as measured by USDA), replacing this restriction with an overall payment limitation of \$450,000 per producer over the authorized life of the 2002 Farm Bill. Many other State and Federal cost share programs base eligibility not on size thresholds but on priority watersheds (e.g., USDA's Small Watershed Program; the New York City Watershed Program), priority contaminants (e.g., Kansas Non-Point Source Pollution Control Fund), or proposed waste management practices (e.g., Maryland, Minnesota, Missouri, Nebraska, and North Carolina state programs). However, technical assistance under most programs is available to all operations, regardless of watershed, contaminants, proposed practices, or size (ERG, 2000a). A review of cost-share and technical assistance programs available to AFOs is provided in the rulemaking record (ERG, 2000a—DCN 70130).

Section 2.4 also describes another source of potential cost offset, which is manure sales, particularly of relatively higher value dry poultry litter. EPA estimates that sales of dry poultry litter could offset the costs of meeting the regulatory requirements on the order of more than 50 percent. As illustrated in the Proposal EA, this reduction alone exceeds the level of cost passthrough (42 percent) assumed at proposal for the cost impact analysis of the broiler sector. Details on how EPA calculated these manure sale offsets and how they would reduce the economic impacts at poultry operations are presented in Section 6 of the Proposal EA.

Finally, this analysis does not take into account certain noneconomic factors that might influence an operation's decision to weather the boom and bust cycles that are commonplace in agricultural markets. Farm typology data from USDA indicate that a large share of farming operations (more than 90 percent) have annual sales of less than \$250,000 and are considered "small family farms" by USDA (USDA/ERS, 2000d, 2000e). Of these, about 60 percent are "limited-resource," "retirement," or "residential" operations where farming is not the primary source of income (USDA/ERS, 2000e, 1999a). In many cases, these operations have negative annual income supplemented by sources of off-farm income that subsidize the farming operation (USDA/ERS, 2000d and 1996a).

USDA's ERS (1996a) reports that about 60 percent of farm operators reporting negative net income had nonfarm occupations. About 75 to 80 percent of farms rely on some nonfarm income, and even in the largest operations nonfarm income can be a significant portion of total household income (USDA/ERS, 1996a). More than 90 percent of farm operators with negative net income had nonfarm income averaging more than \$35,700 per year; even farms with positive net income rely somewhat on nonfarm income (Heimlich and Barnard, 1995; USDA/ERS, 1996a).

When farm income is negative over a period of time, sales tests can be very difficult to interpret (Heimlich and Barnard, 1995). One reason that incomes can remain negative over several years is that operators can supplement farm income with nonfarm income, and these losses can be used to reduce total income tax liabilities while the real estate value of the farm property appreciates. Additional noneconomic factors might also include the satisfaction of working for oneself, the ability to employ family members, a sense of tradition and the ability to pass on that tradition to future generations, and the fact that the operation is both a home and a livelihood. These and other noneconomic factors might influence the decision to close a livestock or poultry operation cannot be adequately addressed in an economic model. To the extent that these factors play a role in that decision, EPA's economic model might overstate the possibility of closure among small businesses.

USDA's farm financial data include operations where farming is part-time and not the primary occupation, but exclude sources of nonfarm income at these operations. As noted in Section 4.2 of the Proposal EA, the inclusion of these operations may result in lower average data values than would be the case if these operations were excluded from the analysis. EPA believes that including of these operations might tend to overstate impacts. Previous analyses by USDA and EPA have also noted the potential effect on average farm data of including these operations and have regarded these part-time business more as "hobbies or recreational activities" (Heimlich and Barnard, 1995; DPRA, 1995). Heimlich and Barnard (1995) further indicate that considering non-farm income in addition to farm income may provide a more appropriate comparison to the costs of required measures where the motivation for staying in business is not necessarily purely economic.

Overall, EPA expects that the CAFO regulations will benefit the smallest businesses in these sectors, because the regulations might create a comparative advantage for small operations that are not subject to the regulations. Except for the few AFOs that are designated as CAFOs, these small operations will not incur costs associated with the final requirements and may benefit from eventual higher producer prices as these markets adjust to higher production costs in the long term.

SECTION FIVE

OTHER REGULATORY ANALYSIS REQUIREMENTS

This section addresses the requirements to comply with Executive Order (EO) 12866 and the Unfunded Mandates Reform Act (UMRA), both which require Federal agencies to assess the costs and benefits of each significant rule they propose or promulgate.

This section is organized as follows. Section 5.1 describes the administrative requirements of both EO 12866 and UMRA. Section 5.2 identifies the reasons why EPA has determined that the existing regulations need to be revised. Section 5.3 provides a summary of the total social costs of the final CAFO regulations. Section 5.4 briefly summarizes the expected pollutant reductions. Section 5.5 summarizes the estimated monetized benefits for regulatory Options 1 and 2.

Much of the information provided in this section is summarized from, and extensively references, other documents that support this rulemaking, as well as other sections of this report that present more detailed accounts of EPA's supporting analyses.

5.1 ADDITIONAL ADMINISTRATIVE AND REGULATORY ANALYSES

5.1.1 Requirements of Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether a regulatory action is "significant" and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines a "significant regulatory action" as one that is likely to result in a rule that may:

- have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities;
- create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

EPA has determined that the final CAFO rulemaking is a "significant regulatory action" under the terms of Executive Order 12866. As such, this action was submitted to OMB for review. Changes made in response to OMB's suggestions or recommendations will be documented in the public record.

In addition to submission of the action to OMB, the principal requirements of the Executive Order are that the Agency perform an analysis comparing the benefits of the regulation to the costs that

the regulation imposes, that the Agency analyze alternative approaches to the rule, and that the need for the rule be identified. Wherever possible, the costs and benefits of the rule are to be expressed in monetary terms. To address the analytical requirements, as specified by the Executive Order, Section 5.2 describes the reasons why EPA is revising the existing regulations, and Sections 5.3 through 5.6 present the estimated social costs, pollutant reductions, and monetary benefits of the proposed CAFO regulations. An in-depth profile of these industry sectors is presented in Section 2 of the Proposal EA and additional information for each affected industry subcategory is provided in Sections 6, 7, and 8 of the Proposal EA. The preamble to the final CAFO regulations describes revisions to the existing regulations, which are briefly summarized in Section 1 of this report).

5.1.2 Requirements of the Unfunded Mandates Reform Act (UMRA)

Title II of the UMRA Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, Tribal, local, governments and the private sector. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with “Federal mandates” that may result in expenditures to State, Tribal, and local governments, in the aggregate, or to the private sector, of \$100 million or more in any one year.

This final rule is anticipated to cost the private sector more than \$100 million per year for the time period analyzed. In particular, this section addresses the following:

- Section 202(a)(1): authorizing language (also see Section 10 of the preamble to the final rule)
- Section 202(a)(2): a qualitative and quantitative assessment of the anticipated costs and benefits of the regulation
- Section 202(a)(3)(A): accurate estimates of future compliance costs (as reasonably feasible)
- Section 202(a)(3)(B): disproportionate effects on particular segments of the private sector
- Section 202(a)(3)(B): disproportionate effects on local communities (this rule is not expected to have disproportionate effects on local communities.)
- Section 205(a): least burdensome option or explanation required (also see Section 4 of the preamble to the final rule)

EPA has determined that the final CAFO regulations contain a Federal mandate that may result in expenditures of \$100 million or more for the private sector in any one year (see Section 3.3). Accordingly, EPA has prepared the written statement required by section 202 of the UMRA. This and previous sections of the EA constitute this statement: Sections 5 through 8 of the EA identify costs and impacts (burdens) on CAFOs that are subject to the final regulations, as well as impacts on processors in these industries and other market affects. Appendix E of the Proposal EA (USEPA, 2001a) presents

information comparing the cost-effectiveness of the proposed regulatory alternatives; Appendix E of this report presents EPA's cost-effectiveness for the final regulations. Additionally, EPA's *Benefits Analysis* (USEPA, 2002k) presents estimated monetary benefits that might accrue under the proposed regulations, as required under UMRA when costs of a federal mandate exceed \$100 million in any one year.

Before promulgating an EPA rule for which a written statement is needed, Section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. In this rule, the Clean Water Act requires EPA to establish effluent limitations for point sources based on the "best available technology economically achievable" (Sections 301(b)(2)(A) and 304(b)(2)). Factors that EPA shall consider in an assessment of best available technology include the cost of achieving effluent reductions, among other factors (Section 304(b)(2)(B)). Pursuant to section 205(a)(1)-(2), EPA selected the least expensive option that also meets the requirement that EPA select the "best available technology economically achievable." More information is provided in Section 4 of the preamble supporting the final regulations.

EPA has also determined that the final CAFO regulations do not include a Federal mandate that may result in estimated costs of \$100 million or more to State, Tribal, or local governments in the aggregate. Accordingly, the regulations contain no regulatory requirements that might significantly or uniquely affect small governments and therefore are not subject to the requirement of Section 203 of the UMRA. Costs incurred by Federal or State governments under the final regulations are presented in Section 5.3. Tribal governments may also incur compliance costs; however, these costs are expected to be modest and have not been estimated. EPA has determined that the regulations do not include requirements that might significantly or uniquely affect local governments; therefore, this rule does not affect small governments as outlined in Section 203. Therefore a small governments agency plan has not been developed. (If EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must have developed under Section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, thus enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.)

5.2 NEED FOR THE REGULATIONS

Executive Order 12866 requires that the Agency identify the need for the regulation or regulations being proposed. A detailed discussion of the need for the regulations is presented in Section 4 of the 2001 Proposal (66 FR 2293-2972-2976). A summary may also be found in Sections 1 and 10 of the Proposal EA. These reasons are summarized briefly below:

- In spite of existing regulatory controls, there is continued discharge and runoff of manure and nutrients from livestock and poultry operations. The proposed regulations are expected to address the impairment of many U.S. waterways and the associated human health and ecological risks by reducing nutrient contributions from animal agriculture.

- Periodic review and revision of existing regulations is envisioned in the CWA. The existing regulations need to be updated to reflect structural changes in these industries over the past few decades. The continued trend toward fewer but larger operations, coupled with greater emphasis on more intensive production methods and specialization, is concentrating more manure nutrients and other animal waste constituents within some geographic areas. This trend has coincided with increased reports of large-scale discharges from these facilities.
- The existing regulation needs to be more effective at protecting or restoring water quality. The revisions will make the regulations easier to understand and better clarify the conditions under which an AFO is a CAFO and, therefore, subject to the regulatory requirements. Currently, few livestock and poultry operations have NPDES permits.

Both UMRA and EO 12866 require the statutory authority for the rule to be cited. A detailed discussion of the objectives and legal basis for these regulations is presented in Sections 1 and 3 of the preamble to the final rule and also the 2001 Proposal (see: 66 FR 2959 or USGPO, 2001a).

5.3 TOTAL SOCIAL COSTS

EPA estimates the total social costs of Option 2 at \$335 million annually in 2001 dollars. These costs include compliance costs borne by CAFOs and administrative costs to States and the Federal government. Costs to regulated CAFOs constitute the bulk of this total cost, estimated by EPA at \$326 million annually. EPA estimates that the administrative cost to Federal and State governments to implement this rule is \$9 million per year. (For purposes of discussing EPA's analysis supporting UMRA, this section discusses results for Option 2 only; see Table 5-1).

5.3.1 Costs to Regulated CAFOs

The largest component of social cost is the cost to industry of complying with the regulation. Costs to industry include annualized capital costs, operating and maintenance costs, start-up and recurring costs, and also record-keeping costs. Estimated costs cover four broad categories, including nutrient management planning, facility upgrades, land application, and technologies for balancing on-farm nutrients. All capital costs are depreciated over a 10-year recovery period, based on the Internal Revenue Code's guidance for single-purpose agricultural or horticultural structures. More detail on how EPA estimates compliance costs for this rulemaking is in the *Development Document* (USEPA, 2002).

Table 5-1 shows the total annualized compliance costs to CAFOs. EPA estimates that of the total estimated social cost of Option 2 (\$335 million annually), compliance costs borne by CAFOs constitute the bulk of this total cost and are estimated by EPA at \$326 million annually. Of this total, compliance cost to operations with more than 1,000 AU are estimated at \$283 million per year. Costs to operations with between 300 and 1,000 AU are estimated at \$39 million per year. Cost to operations that may be designated as CAFOs is estimated at \$4 million annually under Option 2. Information on these costs, along with a comparison of cost estimates for other regulatory options considered by EPA, is provided in Section 3.

These costs are pre-tax and do not reflect tax savings of incurred compliance costs.³⁸ For the purpose of this analysis, estimated pre-tax compliance costs can be viewed as an estimate of the net output loss to the economy, plus consumer and producer surplus losses. EPA does not use an estimate of net output loss because the Agency would then need to compute output gains and consumer and producer surplus losses associated with the proposed regulations. Because the pre-tax costs include no cost passthrough assumptions, no consumer surplus is lost. Additionally, the pre-tax cost will incorporate the loss in producers' surplus. The pre-tax costs of compliance thus serve as an estimate for the net output loss to the economy plus losses in consumer and producer surplus.

EPA assumes that all confinement operations that are defined or designated as CAFOs will incur these costs. Cost estimates include costs to facilities that are projected to experience financial stress that could lead to facility closure. In some cases, it is possible that a CAFO might be liquidated instead of incurring these costs. EPA considers the compliance costs assigned to these model CAFO to be a reasonable upper estimate of the costs to liquidate such operations.³⁹ An operation will choose to liquidate (to the extent that the choice is theirs to make) only when the costs of liquidating are less than the costs of installing and implementing pollution control.

5.3.2 Costs to the Permitting Authority (Federal and State Governments)

As discussed in Section 5.3.1, the overwhelming majority (more than 95 percent) of the estimated total regulatory costs will accrue to industry and to Federal and State governments in the form of foregone tax revenues. However, additional costs will be incurred by the NPDES permitting authority to alter existing state programs and obtain EPA approval to develop new permits, review new permit applications and issue revised permits that meet the final regulatory requirements.

Under the final rule, Federal and State National Pollutant Discharge Elimination System (NPDES) permitting authorities will incur administration costs related to the development, issuance, and tracking of general and individual permits. State NPDES permitting authorities would also incur costs to modify existing State NPDES programs for CAFOs and obtain EPA approval of the modifications. EPA estimates that under the final regulations an estimated 15,400 CAFOs would be permitted. This estimate consists of about 14,920 CAFOs covered by State permits and about 480 CAFOs covered by Federal permits. Administrative costs incurred by State permitting authorities are expected to be \$8.5 million. EPA permitting authorities would incur the remaining \$0.3 million (Table 5-1). These costs are expressed in 2001 dollars and are annualized over the 5-year permit life using a 7 percent discount rate. This analysis is available in the record and in the *Development Document* (USEPA, 2002). This analysis was conducted to evaluate the costs of the proposed rule to governments, as required under the Unfunded Mandates Reform Act (UMRA), as discussed in the preamble to the final regulations.

There are several ways that issuance of general permits will result in administrative costs to State and federal permitting authorities. First, State permitting authorities will need to revise their programs to incorporate changes in the final rule. Second, States will need to revise existing general permits; those

³⁸The tax shield is the cost to the Federal and State governments of subsidizing, in effect, the cost of the final regulations. Tax shields are also a cost to society and must be included in the estimate of social costs.

³⁹These liquidation costs include legal fees, broker fees, and so forth.

that do not currently use them may choose to develop a general permit. The permitting authority is required to give public notice announcing the development of a draft permit and allow an opportunity for public comments. Often permitting authorities issue a response to the public comments received and, occasionally, hold public hearings on the draft general permit. Following the issuance of the final general permit, States and EPA may begin to incur administrative costs per facility. For example, each time a facility operator files a Notice of Intent (NOI) to obtain coverage under a general permit, the permitting authority will incur costs to review the application, file the NOI, or enter permittee information into a permit tracking system. Per-facility administrative costs might also include facility inspections to ensure compliance with permit conditions or to ensure a facility qualifies for coverage under the general permit. Finally, State and federal NPDES permitting authorities will need to review the annual reports submitted by each facility covered by a general permit.

When a facility submits an application for an individual permit, the permitting authority incurs administrative costs for review of the individual permit application and development of the individual permit by a permit writer. Additionally, public notice must be given about the development of the draft permit, and the authority may respond to any comments received and conduct public hearings as needed. Facility inspections might also be necessary prior to issuing a permit or to ensure compliance with permit conditions. As with general permits, permitting authorities will incur expenses for record-keeping, associated filing and tracking of individual permit applications and review of annual reports submitted by each facility covered by an individual permit.

EPA assumes that under the final regulations an estimated 15,400 CAFOs would be permitted. This estimate consists of 14,920 State permits (10,440 general and 4,480 individual permits) and 480 Federal permits (340 general and 140 individual permits). Table 5-2 shows EPA's estimate of the number of CAFO permits by State and EPA Region. More information on EPA's estimates is provided in the *Development Document* (USEPA, 2002) and rulemaking record.

The unit permit costs EPA assumed for this analysis are based on information obtained from State and EPA Regional permitting personnel. The cost assumptions used to develop, review, and approve permits and inspect facilities, as well as the estimate of annual administrative costs is presented in the *Development Document* (USEPA, 2002). These documents also provide detailed discussions on EPA's assumptions for the state and federal wage rates used to estimate costs.

5.3.3 Other Social Costs

An estimate of total social costs of the proposed regulations comprises costs that go beyond the compliance costs of constructing and implementing pollution control procedures. Some of these additional costs are monetary, but many are nonmonetary or not easily monetized (i.e., a dollar value cannot be attributed or is difficult to attribute to the items).

Additional monetary costs include the cost of Federal and State subsidies in the form of a tax shield (or lost tax revenue) and costs of administering a regulation (permitting costs). These costs are presented in Sections 5.3.1 and 5.3.2. Other costs, however, might also be incurred under the proposed regulations and constitute the full range of total social costs. For example, costs might be incurred as a result of worker dislocations. These costs comprise the value to workers of avoiding unemployment and the costs of administering unemployment, including the costs of relocating workers, and the inconvenience, discomfort, and time loss associated with unemployment (the unemployment benefits

themselves are generally considered transfer payments, not costs). Other potential social costs include the cost associated with a slowdown in the rate of innovation. In theory, there might be some impact on the rate of innovation to the extent that farms might invest in newer technologies if they did not have to allocate resources to meeting the requirements of the proposed regulations. Generally, however, unless an industry is highly technical, with major investments in research and development, impacts on the rate of innovation are likely to be minimal.

Monetizing such social costs is difficult. EPA does not evaluate these other potential social costs but expects that such costs that are not specifically addressed by the analyses presented in this report will be modest.

Table 5-1 Annual Pre-tax Cost of the Rule, \$2001 (Option 2)

| Sector | #Operations/Permittees | | Aggregate Incremental Costs | | | |
|------------------------------------|------------------------|--------------|-----------------------------|-----------|--------------|------------------|
| | >1,000 AU | 300-1,000 AU | Total | >1,000 AU | 300-1,000 AU | Designated CAFOs |
| | (number) | | (\$2001, millions, pre-tax) | | | |
| Regulated CAFOs ^{a/} | | | | | | |
| Fed Cattle | 1,766 | 174 | \$88.2 | \$85.8 | \$1.9 | \$0.5 |
| Veal | 12 | 230 | \$0.0 | <\$0.1 | <\$0.1 | \$0.0 |
| Heifer | 242 | 7 | \$6.3 | \$3.8 | \$2.4 | \$0.1 |
| Dairy | 1,450 | 1,949 | \$151.1 | \$128.2 | \$22.0 | \$0.9 |
| Hogs | 3,924 | 1,485 | \$34.8 | \$24.9 | \$9.5 | \$0.4 |
| Broilers | 1,632 | 520 | \$20.5 | \$16.8 | \$2.4 | \$1.3 |
| Layers - Dry | 729 | 26 | \$7.5 | \$7.2 | \$0.1 | \$0.2 |
| Layers - Wet | 383 | 24 | \$8.9 | \$8.4 | \$0.5 | <\$0.1 |
| Turkeys | 388 | 37 | \$8.7 | \$8.1 | \$0.3 | \$0.3 |
| Total | 10,526 | 4,452 | \$326.0 | \$283.2 | \$39.1 | \$3.8 |
| Permitting Authority ^{b/} | | | | | | |
| States | NA | NA | \$8.7 | NA | NA | ND |
| Federal | NA | NA | \$0.3 | NA | NA | ND |
| Subtotal | 10,526 | 4,452 | \$9.0 | \$6.0 | \$3.0 | ND |
| Total Social Costs | | | | | | |
| TOTAL | 10,526 | 4,452 | \$335.0 | \$289.2 | \$42.1 | \$3.8 |

Source: USEPA. May not add due to rounding. Number of operations and total costs shown do not include designated facilities. "Layers: dry" are operations with dry manure systems. "Layers: wet" use liquid systems.

^{a/}See Section 3 of this report for more information on the number and cost to affected CAFOs.

^{b/}Number of permits includes permits for designated facilities on an annualized basis. Table 5-2 provides additional information on estimated number of permits.

Table 5-2. Medium and Large CAFOs by Region, State, and Sector

| Region and State | Beef | Veal | Dairy | Heifer | Swine | Broiler | Turkey | Layer |
|-------------------------|-------------|-------------|--------------|---------------|--------------|----------------|---------------|--------------|
| Region 1 | 0 | 0 | 137 | 0 | 1 | 0 | 14 | 17 |
| Connecticut | 0 | 0 | 18 | 0 | 0 | 0 | 1 | 7 |
| Maine | 0 | 0 | 18 | 0 | 0 | 0 | 5 | 5 |
| Massachusetts | 0 | 0 | 13 | 0 | 1 | 0 | 3 | 3 |
| New Hampshire | 0 | 0 | 8 | 0 | 0 | 0 | 2 | 0 |
| Rhode Island | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Vermont | 0 | 0 | 79 | 0 | 0 | 0 | 3 | 2 |
| Region 2 | 2 | 0 | 352 | 0 | 10 | 0 | 9 | 20 |
| New Jersey | 0 | 0 | 6 | 0 | 1 | 0 | 2 | 3 |
| New York | 2 | 0 | 346 | 0 | 9 | 0 | 7 | 17 |
| Region 3 | 10 | 0 | 245 | 0 | 170 | 284 | 37 | 147 |
| Delaware | 2 | 0 | 6 | 0 | 4 | 58 | 0 | 0 |
| Maryland | 0 | 0 | 31 | 0 | 11 | 67 | 2 | 15 |
| Pennsylvania | 6 | 0 | 135 | 0 | 135 | 50 | 14 | 122 |
| Virginia | 2 | 0 | 65 | 0 | 19 | 89 | 18 | 10 |
| West Virginia | 0 | 0 | 8 | 0 | 1 | 20 | 3 | 0 |
| Region 4 | 4 | 0 | 354 | 0 | 1292 | 1226 | 78 | 318 |
| Alabama | 0 | 0 | 17 | 0 | 16 | 290 | 3 | 45 |
| Florida | 0 | 0 | 99 | 0 | 4 | 37 | 7 | 45 |
| Georgia | 0 | 0 | 61 | 0 | 54 | 372 | 3 | 137 |
| Kentucky | 1 | 0 | 31 | 0 | 61 | 30 | 1 | 6 |
| Mississippi | 0 | 0 | 17 | 0 | 17 | 214 | 1 | 10 |
| North Carolina | 2 | 0 | 56 | 0 | 1076 | 197 | 39 | 27 |
| South Carolina | 1 | 0 | 17 | 0 | 27 | 39 | 22 | 46 |
| Tennessee | 0 | 0 | 56 | 0 | 37 | 47 | 2 | 2 |
| Region 5 | 105 | 16 | 622 | 121 | 1742 | 34 | 102 | 214 |
| Illinois | 31 | 0 | 27 | 9 | 442 | 0 | 8 | 11 |
| Indiana | 5 | 2 | 31 | 7 | 403 | 1 | 18 | 63 |
| Michigan | 20 | 1 | 127 | 2 | 84 | 0 | 17 | 20 |
| Minnesota | 39 | 3 | 112 | 46 | 595 | 19 | 26 | 27 |
| Ohio | 7 | 3 | 58 | 8 | 142 | 4 | 20 | 82 |
| Wisconsin | 3 | 7 | 267 | 49 | 76 | 10 | 13 | 11 |
| Region 6 | 330 | 0 | 337 | 69 | 171 | 542 | 59 | 192 |
| Arkansas | 0 | 0 | 8 | 0 | 106 | 277 | 40 | 55 |
| Louisiana | 0 | 0 | 22 | 0 | 1 | 66 | 2 | 5 |
| New Mexico | 21 | 0 | 103 | 27 | 0 | 0 | 1 | 2 |
| Oklahoma | 45 | 0 | 15 | 13 | 48 | 75 | 4 | 18 |
| Texas | 264 | 0 | 189 | 29 | 16 | 124 | 12 | 112 |
| Region 7 | 1072 | 0 | 117 | 46 | 1809 | 42 | 53 | 99 |
| Iowa | 166 | 0 | 43 | 17 | 1236 | 3 | 15 | 65 |
| Kansas | 294 | 0 | 22 | 8 | 130 | 0 | 4 | 5 |
| Missouri | 21 | 0 | 31 | 11 | 195 | 39 | 30 | 16 |
| Nebraska | 591 | 0 | 21 | 10 | 248 | 0 | 4 | 13 |

Table 5-2. Medium and Large CAFOs by Region, State, and Sector

| Region and State | Beef | Veal | Dairy | Heifer | Swine | Broiler | Turkey | Layer |
|------------------|------------|----------|------------|-----------|------------|-----------|-----------|------------|
| Region 8 | 273 | 0 | 121 | 65 | 188 | 0 | 22 | 20 |
| Colorado | 153 | 0 | 42 | 23 | 16 | 0 | 5 | 7 |
| Montana | 15 | 0 | 3 | 0 | 13 | 0 | 3 | 0 |
| North Dakota | 6 | 0 | 6 | 1 | 20 | 0 | 2 | 0 |
| South Dakota | 72 | 0 | 28 | 10 | 133 | 0 | 3 | 6 |
| Utah | 12 | 0 | 40 | 27 | 5 | 0 | 7 | 7 |
| Wyoming | 15 | 0 | 2 | 4 | 1 | 0 | 2 | 0 |
| Region 9 | 64 | 0 | 851 | 72 | 16 | 9 | 28 | 102 |
| Arizona | 16 | 0 | 70 | 13 | 3 | 0 | 1 | 1 |
| California | 43 | 0 | 763 | 59 | 11 | 9 | 26 | 98 |
| Hawaii | 2 | 0 | 6 | 0 | 2 | 0 | 0 | 3 |
| Nevada | 3 | 0 | 12 | 0 | 0 | 0 | 1 | 0 |
| Region 10 | 80 | 0 | 263 | 99 | 10 | 15 | 23 | 33 |
| Alaska | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Idaho | 46 | 0 | 132 | 48 | 3 | 0 | 2 | 4 |
| Oregon | 13 | 0 | 28 | 19 | 3 | 7 | 13 | 7 |
| Washington | 21 | 0 | 103 | 32 | 4 | 8 | 8 | 22 |

Source: USEPA, 2002, 2002n. May not add due to rounding.

5.4 POLLUTANT REDUCTIONS

EPA's analysis of pollutant discharges under the final rule addresses changes in pollutant discharges occurring at the production area, and also changes in the quantity of pollutants in runoff from land on which manure has been applied. Estimates of pollutant discharges from these manure application sites, or "edge-of-field" loadings, include nutrients, metals, pathogens, and sediment for both pre-rule conditions (baseline) and post-rule conditions.

Table 5.2 provides estimates for combined total (all animal sectors) baseline and post-regulation edge of field loading reductions for CAFOs with more than 1,000 AU only for Option 2.

Table 5.3 Edge of Field Loading Reductions for CAFOs (Option 2, >1,000AU), All Sectors

| Parameter/Units | Baseline Pollutant Loading (Pre-regulation) | Post-regulation Pollutant Loading | Pollutant Reduction | |
|----------------------------------|---|---|---------------------|---------|
| | | | Units | Percent |
| Nutrients (million lb.) | 658 | 503 | 155 | 24 |
| Metals (million lb.) | 20 | 19 | 1 | 5 |
| Pathogens (10 ¹⁹ cfu) | 5,784 | 3,129 | 2,655 | 46 |
| Sediment (million lb.) | 35,493 | 33,434 | 2,059 | 6 |

Source: USEPA; see Development Document (2002).

EPA estimates edge-of-field loadings using a simulation modeling approach based on representative model CAFOs used to estimate compliance costs of the final regulations, as described in *Development Document* (USEPA, 2000a, 2002). This model uses estimates of manure generation and information on cropping systems specific to animal operations under various pre- and post-regulation model simulation conditions. Model CAFOs take into account differing conditions at representative operations. These conditions include animal type, production region, facility size, current management systems and practices, and regionally based physiographic conditions regarding soil, rainfall, hydrology, crop rotation, and other factors. Reductions in pollutant discharges using the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model, which uses information on soil characteristics and climate, along with characteristics of the applied manure and commercial fertilizers, to estimate losses of nutrients, metals, pathogens, and sediment in surface runoff, sediment, and ground water leachate. EPA used GLEAMS to quantify the reduction of nitrogen and phosphorus loads, and reductions of discharges of zinc, copper, cadmium, nickel, lead, and arsenic. Fecal coliform and Fecal streptococcus were used as surrogates to estimate pathogen reductions that would likely be achieved by this rule.

Edge-of-field loadings are differentiated by broad animal sector categories (cattle, dairy, hog, and poultry). More details on these models and a summary of the estimated loadings and post-compliance reductions are provided in the *Development Document* (USEPA, 2000a, 2002).

Edge-of-field loading estimates are used as inputs to EPA's water quality modeling framework that simulates the potential amount of pollutant loadings that reach U.S. waterways (measured as rivers and streams). The resultant loading estimates are referred to in EPA's analysis as "at-stream" loadings. Information on EPA's fate and transport model and a comparison of edge-of-field loadings and pollutants that reach U.S. waters is provided in the *Benefits Analysis* (USEPA, 2000d, 2002k). This analysis indicates that roughly 80 percent of all land applied manure runoff of nitrogen, phosphorous, and sediments (edge-of-field) reach U.S. waters (at-stream) (USEPA, 2000d, 2002k). The level of nutrients reaching U.S. waters can be explained by differing assumptions on a variety of levels, including manure generation by animal species, the share of animals in confinement, and losses due to volatilization and management practice, as well as other factors, including rounding and truncation error and assumptions regarding background levels.

Tables 5.4 through 5.6 provide a more in-depth presentation of edge of field loading reductions for all contributors by pollutant, option, sector size, and sector.

5.5 COMPARISON OF COST AND BENEFITS ESTIMATES

This section compares the estimated costs and benefits attributable to the final rule for both Option 1 and Option 2 for CAFOs with more than 1,000 AU only. Tables 5-7 and 5-8 present the annualized estimated costs and benefits in 2001 dollars (pre-tax) assuming both a 7-percent and a 3-percent discount rate, respectively. This section provides only a summary of EPA's analysis of the estimated monetized benefits of the final regulations, which is based on the more detailed assessment available in the Agency's *Benefits Analysis* (USEPA, 2002k).

These tables show that the economic value of the environmental benefits EPA is able to monetize (i.e., evaluate in dollar terms) is comparable to the estimated costs of the rule. EPA has estimated the monetized benefits of the final rule for all operations with more than 1,000 AU. Assuming a 7-percent

Table 5-4 Edge-of-Field Loading Reductions (All Contributions) Nitrogen

| Sector | Option 1 | Option 2 | Option 3 | Option 5 |
|---|-------------------|----------|----------|----------|
| | million lbs./year | | | |
| All Operations CAFOs >1000 AU | | | | |
| Cattle | 45.2 | 47.9 | 54.3 | 47.9 |
| Dairy | 14.1 | 14.7 | 17.9 | 14.7 |
| Hogs | 0.3 | 4.0 | 13.6 | (21.3) |
| Poultry | 29.9 | 36.4 | 38.1 | 41.6 |
| Total | 89.6 | 103.0 | 123.8 | 82.9 |
| Operations Defined as CAFOs 300- 1,000 AU | | | | |
| Cattle | 0.17 | 0.22 | 0.22 | 0.22 |
| Dairy | 4.59 | 5.03 | 7.34 | 5.03 |
| Hogs | 0.03 | 0.98 | 3.11 | (0.59) |
| Poultry | 0.81 | 0.88 | 0.90 | 0.95 |
| Total | 5.60 | 7.10 | 11.56 | 5.60 |

Source: USEPA (USEPA, 2002)

Table 5-5 Edge-of-Field Loading Reductions (All Contributions) Phosphorous

| Sector | Option 1 | Option 2 | Option 3 | Option 5 |
|--|-------------------|----------|----------|----------|
| | million lbs./year | | | |
| All Operations CAFOs >1000 AU | | | | |
| Cattle | 15.6 | 23.1 | 23.1 | 23.1 |
| Dairy | 3.2 | 5.0 | 5.0 | 5.1 |
| Hogs | 0.1 | 4.7 | 4.7 | 8.1 |
| Poultry | 8.5 | 19.2 | 19.2 | 20.4 |
| Total | 27.4 | 52.1 | 52.1 | 56.5 |
| Operations Defined as CAFOs 300-1,000 AU | | | | |
| Cattle | 0.05 | 0.27 | 0.27 | 0.27 |
| Dairy | 1.33 | 2.55 | 2.55 | 2.55 |
| Hogs | 0.01 | 0.70 | 0.70 | 1.50 |
| Poultry | 0.26 | 0.72 | 0.72 | 0.73 |
| Total | 1.66 | 4.24 | 4.24 | 5.05 |

Source: USEPA (USEPA, 2002)

Table 5-6 Edge-of-Field Loading Reductions (All Contributions) Sediment

| Sector | Option 1 | Option 2 | Option 3 | Option 5 |
|--|-------------------|----------|----------|----------|
| | million lbs./year | | | |
| All Operations CAFOs >1000 AU | | | | |
| Cattle | 1,523.5 | 1,523.5 | 1,523.5 | 1,523.5 |
| Dairy | 126.0 | 126.1 | 126.1 | 126.1 |
| Hogs | 0.0 | 143.5 | 143.5 | (584.7) |
| Poultry | 31.2 | 265.9 | 265.9 | 310.7 |
| Total | 1,680.8 | 2,059.0 | 2,059.0 | 1,375.6 |
| Operations Defined as CAFOs 300-1,000 AU | | | | |
| Cattle | 1.4 | 20.1 | 20.1 | 20.1 |
| Dairy | 2.6 | 57.5 | 57.5 | 57.5 |
| Hogs | 0.0 | 20.0 | 20.0 | 12.1 |
| Poultry | 2.2 | 6.0 | 6.0 | 6.6 |
| Total | 6.3 | 103.6 | 103.6 | 96.3 |

Source: USEPA (USEPA, 2002)

discount rate, under Option 1, total monetized benefits for CAFOs with more than 1,000 AU range from \$141 million to \$224 million. For Option 2 (assuming a 7-percent rate), total monetized benefits for CAFOs with more than 1,000 AU range from \$204 million to \$340 million annually. Assuming a 3-percent discount rate, under Option 1, total monetized benefits for CAFOs with more than 1,000 AU range from \$157 million to \$240 million. For Option 2 (assuming a 3-percent rate), total monetized benefits for CAFOs with more than 1,000 AU range from \$219 million to \$255 million annually. See Table 5-7 and Table 5-8.

Monetized benefit categories are primarily in the areas of improved surface water quality (measured in terms of enhanced recreational value), reduced nitrates in private wells, reduced shellfish bed closures from pathogen contamination, and reduced fish kills from episodic events. EPA also identified a number of benefits categories that could not be monetized, including reduced eutrophication of estuaries, reduced pathogen contamination in private wells, reduced health and environmental risks associated with episodic pollutant discharge events, drinking water treatment cost savings, reduced odor and air emissions, and avoided loss in property value near CAFOs, among other benefits. These benefits are listed in Tables 5-7 and 5-8, and are described in more detail the *Benefits Analysis* and other supporting documentation provided in the record.

These estimated benefits compare to EPA's estimate of the total social costs covering both industry and permit authority costs for operations with more than 1,000 AU only. Assuming a 7-percent discount rate, these costs range from \$125 million (Option 1) to \$289 million (Option 2) annually for all CAFOs with more than 1,000 AU, as was estimated in the Agency's *Benefit Analysis*. Assuming a 3-percent discount rate, these costs range from \$132 million (Option 1) to \$285 million (Option 2) annually for all CAFOs with more than 1,000 AU. See Table 5-7 and Table 5-8. These costs include compliance costs to all CAFOs, as well as administrative costs to Federal and State governments. EPA estimates of the administrative cost to Federal and State governments to implement this rule is \$9 million per year.

There may be additional social costs that have not been monetized. However, these costs are estimated based on the cost of land application based on nitrogen-based application rates, except in those instances where EPA believes that phosphorus-based rates are likely to be appropriate. As discussed previously, the final rule includes provisions for appropriate flexibilities in the use of phosphorus-based rates, such as multi-year phosphorus application, but the potential costs savings resulting from these flexibilities are not reflected in the analysis. Therefore, the costs of this rule may have been overestimated.

Table 5-7 Total Annual Monetized Social Costs and Benefits (7% Rate): CAFOs >1,000AU

| Category | Option 1 | Option 2 |
|--|----------------------------------|----------------------------------|
| | millions \$2001 | |
| Total Monetized Social Costs | | |
| Industry Compliance Costs (pre-tax): | \$119 | \$283 |
| State/Federal Administrative Costs: | \$6 | \$6 |
| Total Social Costs | \$125 | \$289 |
| Total Monetized Benefits | | |
| Improved Surface Water Quality\$166.2 to \$298.6 | \$102.4 - \$182.6 | \$166.2 - \$298.6 |
| Reduced Incidence of Fish Kills\$0.1 | \$0.0 - \$0.1 | \$0.1 |
| Improved Commercial Shell Fishing\$0.3 to \$3.4 | \$0.1 - \$2.0 | \$0.3 - \$3.4 |
| Reduced Contamination of Private Wells\$30.9 | \$33.3 | \$30.9 |
| Reduced Contamination of Animal Water Supplies | \$4.7 | \$5.3 |
| Reduced Eutrophication of Estuaries\$1.1 to \$1.7 | \$0.1 | \$0.2 |
| Reduced Water Treatment Costs | \$0.7 - \$1.0 | \$1.1 - \$1.7 |
| Reduced eutrophication & pathogen contamination of coastal & estuarine waters | not monetized | not monetized |
| Reduced pathogen contamination of private & public underground sources of drinking water | not monetized | not monetized |
| Reduced human & ecological risks from antibiotics, hormones, metals, salts | not monetized | not monetized |
| Improved soil properties | not monetized | not monetized |
| Reduced cost of commercial fertilizers for non-CAFO operations | not monetized | not monetized |
| Total Benefits | \$141.3 + [B] - \$223.8 + [B] | \$204.1 + [B] - \$340.2 + [B] |

Source: USEPA. May not add due to rounding. [B] represents the non-monetized benefits of the rule.

Table 5-8 Total Annual Monetized Social Costs and Benefits (3% Rate): CAFOs >1,000AU

| Category | Option 1 | Option 2 |
|--|----------------------------------|----------------------------------|
| | millions \$2001 | |
| Total Monetized Social Costs | | |
| Industry Compliance Costs (pre-tax): | \$279 | \$122 |
| State/Federal Administrative Costs: | \$6 | \$6 |
| Total Social Costs | \$285 | \$132 |
| Total Monetized Benefits | | |
| Improved Surface Water Quality | \$102.4 - \$182.6 | \$166.2 - \$298.6 |
| Reduced Incidence of Fish Kills | \$0.0 - \$0.1 | \$0.1 |
| Improved Commercial Shell Fishing | \$0.1 - \$2.0 | \$0.3 - \$3.4 |
| Reduced Contamination of Private Wells | \$49.3 | \$45.7 |
| Reduced Contamination of Animal Water Supplies | \$4.7 | \$5.3 |
| Reduced Eutrophication of Estuaries | \$0.1 | \$0.2 |
| Reduced Water Treatment Costs | \$0.7 - \$1.0 | \$1.1 - \$1.7 |
| Reduced eutrophication & pathogen contamination of coastal & estuarine waters | not monetized | not monetized |
| Reduced pathogen contamination of private & public underground sources of drinking water | not monetized | not monetized |
| Reduced human & ecological risks from antibiotics, hormones, metals, salts | not monetized | not monetized |
| Improved soil properties | not monetized | not monetized |
| Reduced cost of commercial fertilizers for non-CAFO operations | not monetized | not monetized |
| Total Benefits | \$157.3 + [B] - \$239.8 + [B] | \$218.9 + [B] - \$355.0 + [B] |

Source: USEPA. May not add due to rounding. [B] represents the non-monetized benefits of the rule.